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Shop Safety in the West Allis Public Schools

Roy R. Van Duzee *

THE school, the parent, and the shop student are vitally concerned in promoting safety in the school shops. In spite of the most careful instruction on the part of the shop teacher, occasionally an accident will occur and then questions are raised as to whether or not everything possible was done to prevent that accident. In order to bring about a better understanding of shop regulations and safety for the purpose of preventing accidents and to have a record of the instruction along those lines, a committee of industrial-arts teachers consisting of Messrs. George Knoblauch, E. A. Byerly, and D. E. Ferguson, worked out a program which was adopted in the industrial-arts department. The plan consists of three parts: First, safety rules common to all shops; second, the placarding of dangerous machines; and third, safety instruction for the individual machine. A record kept shows which students are eligible to work on the various machines. The plan and some instruction sheets follow:

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1. General shop rules. These are posted in all shops. These rules are also mimeographed so that they can be put into the hands of the students. In one of the early lessons on safety, the teacher gets the signature of each boy in the class certifying that he has read, studied, and understood the general shop rules.

2. Signs are placed on dangerous machines which are guarded, stating under what conditions the guard may be removed, and warning that the machine is not to be adjusted while it is in motion. Safety bulletins on accident prevention are posted on the shop bulletin board.

3. Either in a group or individually, each student has the adjustment, care, and operation of each power machine demonstrated to him before he is permitted to work on it. Further, the student studies an instruction sheet or responds to an objective-type examination on the machine before it is used by him.

Explanation of Safety Illustrations
By E. A. Byerly and Roy R. Van Duzee

Figure 1 shows a student jointing a block which is entirely too short for the machine. The danger lies in the fact that the

General Shop Rules (For All Shops)

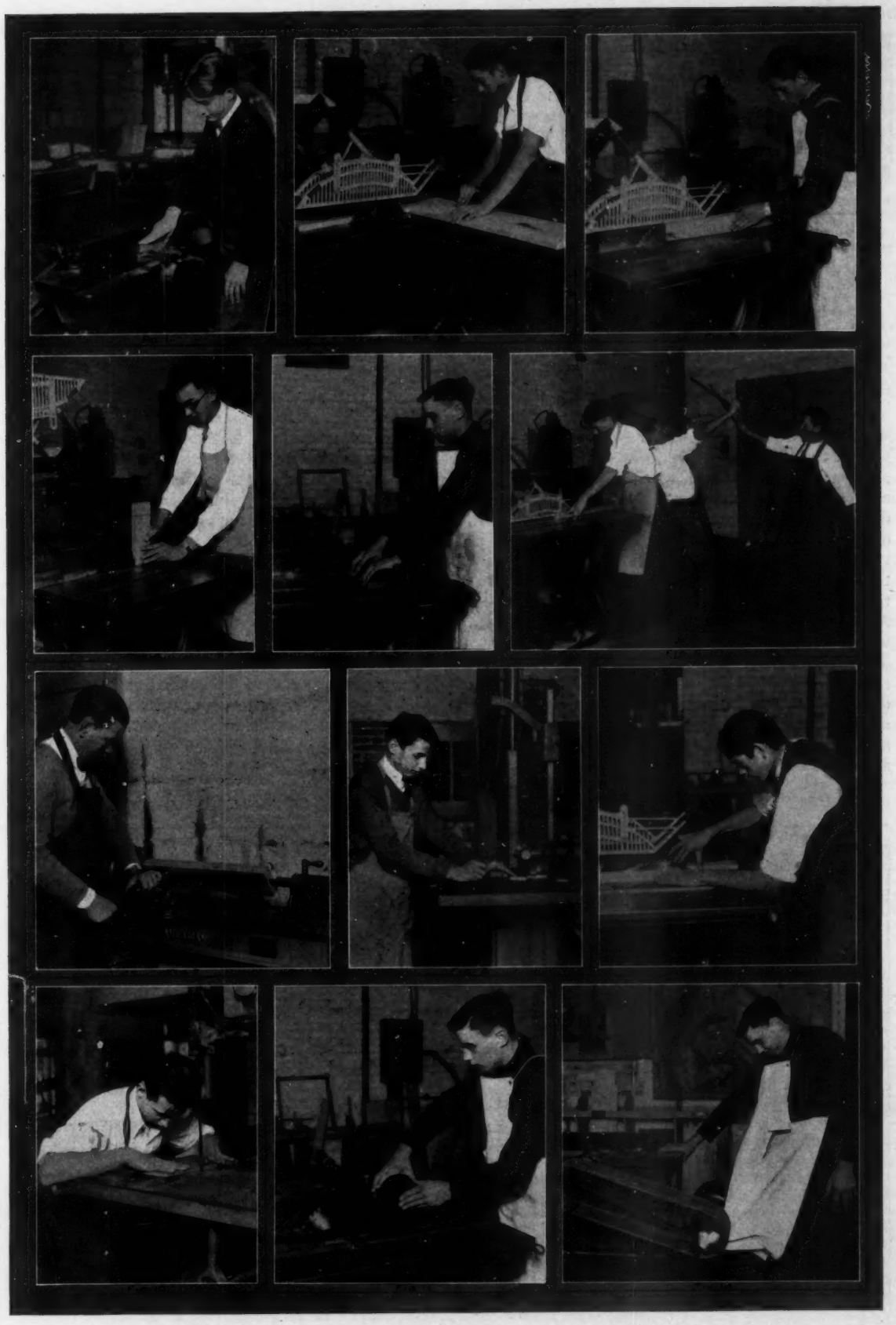
1. Students must be attired in proper shop dress as specified by the instructor in charge:
   a) .....
   b) .....
2. Playing, scuffling, and inattention to work will be cause for dismissal from the course.
3. Only one person shall be allowed at each bench or machine, unless given permission otherwise, by the instructor in charge.
4. Students will not be permitted to operate machines until a complete demonstration of that machine has been given by the instructor.
   a) Group instruction will be given to the entire class, followed by individual instruction.
   b) Either in a group or individually, each student will have the adjustment, care, and operation of power machine demonstrated to him before working on such machine. Further, the student will have studied an instruction sheet or responded to an objective-type examination on the machine to be used.
5. Any unfamiliar or dangerous set-up shall be inspected by the instructor before a machine is started. Machines or loads blocked up will be inspected by the instructor before working under them.
6. Machines must never be cleaned, adjusted, or repaired while they are in motion.
7. On any machine provided with a guard, the guard shall not be removed without consent of the instructor.
8. While working with or on keen-edge tools, the hands must always be behind the cutting edge of the tool.
9. Goggles must be worn while operating speed lathe, grinders, and while welding, and at other times as specified by the instructor.
10. The use of worn-out or improper tools, such as damaged hammers, cold chisels, files without handles, etc., will be prohibited.
11. Permission to throw in light or power switches must be obtained from the instructor.

INDUSTRIAL-ARTS DEPARTMENT

Shop ..... Hour ..... Date .....
Instructor.....

I have carefully read all of the general shop rules and regulations, and have had them explained by the instructor in charge. My conduct while in this shop will be governed by the foregoing rules and regulations.

Student sign here.....



stock can be held with one hand only and is likely to be kicked from under the hand as the end strikes the knives, in which case the hand is in such a position that the fingers are sure to be forced into the throat of the machine due to the downward pressure being exerted on the block. Stock shorter than 12 in. should never be jointed on a hand planer of this kind. Two hands should always be used when jointing stock.

Figure 2 shows a boy who is crosscutting on the variety saw. The boy is crosscutting with a ripsaw, has the saw too high above the table, the splitter guard is not in place nor is the guard dropped down in its proper position. The boy is also attempting to use the fence as a stop or gauge with no clearance provided as the work is moved into the saw. The danger is that the saw may get pinched and throw the stick toward the operator. For the job illustrated, the crosscut saw should be used, it should be raised only as high as is necessary to do the work. Both the splitter guard and saw guard should be in place for this type of work.

Figure 3 shows a boy who is ripping a piece of warped and twisted stock. This is a dangerous undertaking, as the saw is liable to become pinched by the sudden twisting of the stock and thrown back toward the operator. The side of the stock in contact with the table should be trued before ripping.

Figure 4 shows a boy making cheek cuts on the circular saw. This is an operation which cannot be guarded. The boy in the picture has his hands wrongly placed. They should be well above the saw in order to avoid getting into the saw. This operation is one which should be performed by only experienced students; others should cut cheek cuts by hand.

Figure 5 shows a boy crosscutting on the circular saw. This boy is laying himself open to serious injury, because the saw is extending above the table higher than is necessary and the guard is not in place over the saw. The guard should always be in place where the operation being done permits it. Serious injury may be avoided if the saw is allowed to extend not more than one fourth of an inch above the stock being cut.

Figure 6 shows a boy with proper set-up who is attending strictly to business. He is, however, in danger of serious injury as a result of the thoughtless action of the two fencers behind him. Scuffling or rowdy conduct at work is always potentially dangerous. The rubber matting on the floor is a necessary safety precaution, as it prevents slipping on a floor worn smooth by many feet.

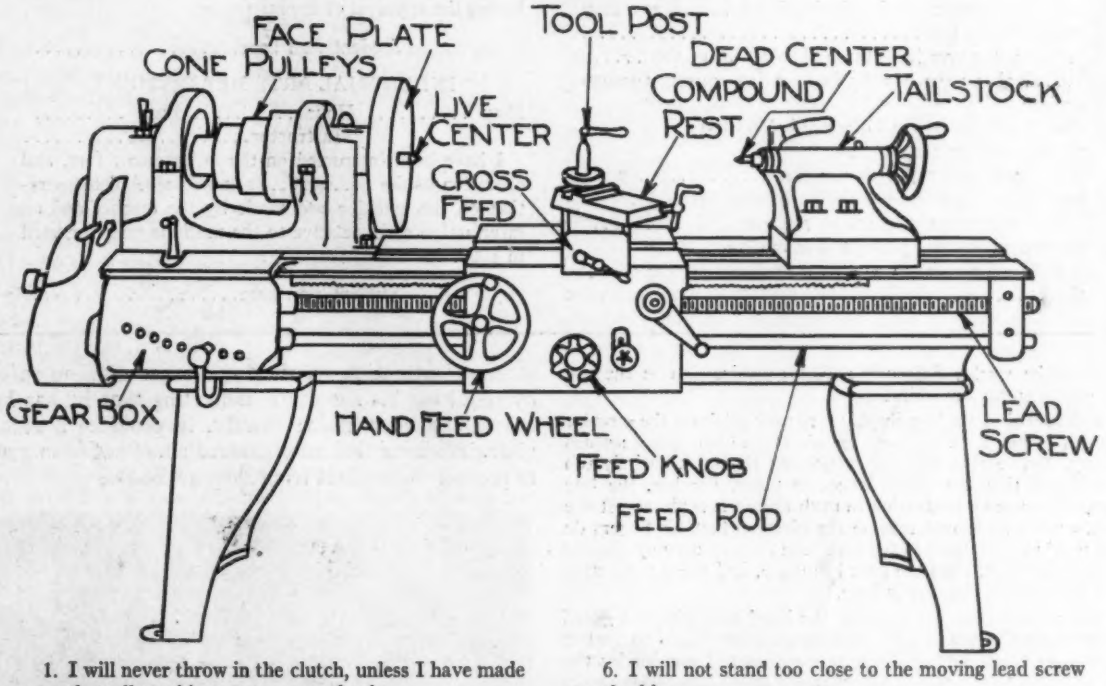
Figure 7 shows a boy turning an irregular-shaped piece of stock in the lathe. When work of this kind is performed, care should be taken to feed the tool into the work slowly to prevent the tool from being jerked into the work and then being thrown out. This sometimes causes cuts to the operator's hands. Taking too large a cut may also jerk the stock from between the centers.

Figure 8 shows a boy playing with little blocks on the bandsaw table. This is a dangerous practice and may lead to serious injury. One should never play around power machinery, but should attend strictly to the job at hand observing the safety

Sample Shop-Instruction Sheet

MACHINE SHOP

Instruction Sheet on Engine-Lathe Safety

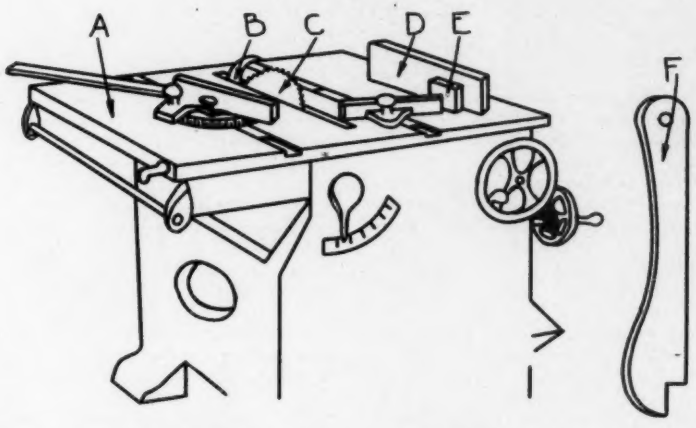


1. I will never throw in the clutch, unless I have made sure that all working parts move freely.
2. I will never leave the tool-post wrench on the tool post.
3. I will shift all belts on the cone pulleys with the belt shifter or a stick (never with the hands).
4. I will keep guards over pulleys, gears, etc., in place at all times.
5. I will be careful not to wear, or at least so to arrange, my clothing that cuffs, ties, and flowing or loose garments cannot catch in the dog or faceplate.
6. I will not stand too close to the moving lead screw or feed bar.
7. I will never attempt to uncurl a shaving with the hands, calipers, or micrometers.
8. I will never oil or clean the machine while it is in operation.
9. I will never operate any lever with which I am unfamiliar. I will use a little common sense and judgment before throwing in gears.
10. I will never caliper a piece while the machine is in motion.

Student sign here.....

Sample Safety Test

INDUSTRIAL-ARTS DEPARTMENT
WOODSHOP
Safety Test Variety Saw



In each of the statements below you are to fill in the blanks to make the statement complete and also locate the part in the sketch and give its proper letter.

1. I will never attempt to rip anything on the variety saw without first seeing that the .... is locked.
2. I will never use the ripping fence ..... as a stop without using the ....
3. I will never have more than ¼ in. of the .... above the board when cutting entirely through a piece.
4. I will never stand directly behind the .... while operating the machine.
5. I will never fail to use the .... without first getting the permission of the instructor.
6. I will never attempt to remove .... from near the saw while it is in motion.
7. I will never rip narrow strips without the use of the ....
8. I will never use the saw for ripping or crosscutting without having the .... in place to prevent kick backs.
9. I will never be guilty of ..... with another boy while in the millroom.
10. I will never attempt any new set-up without first having the approval of the instructor.

Student sign here.....

INDUSTRIAL-ARTS DEPARTMENT

Shop ..... Hour ..... Date .....
Instructor.....

I have been instructed on the adjustment, care, and operation of the ..... machine. A demonstration on the machine was made by the teacher and an information sheet relative to the machine was discussed in class.

Student sign here.....

rules as he works. Safety is a first consideration in the use of any dangerous machine.

Figure 9 shows a boy ripping a narrow stick on the circular saw. It is just such a set-up as this one which causes serious injury. Notice that the saw is clearing the work entirely too much and that the guard is not in place. Further, the boy should be using a push stick to push the narrow piece past the saw, or else he should reverse the piece so that his fingers do not need to pass close to the saw. Run the saw up only slightly above the work, keep the guard in place, and use a push stick are precautions that apply here.

Figure 10 shows a boy using the band saw with the guard way above the work. The guard should be placed so that it covers as much of the blade as possible and not hinder the operator. A set-up of this nature might result in a serious scalp injury or injury to hands or arms.

Figure 11 shows a boy attempting to rip a disk. This is a dangerous undertaking, because the unguarded saw is raised so high above the table and as soon as the saw comes in contact with the disk it will revolve, drawing the hand into the saw. This operation should never be attempted.

Figure 12 shows an apron not properly fastened at the waist. This is always potentially dangerous. The picture shows how the loose ends may be caught by the belt or shafting. If this occurs, the result will likely be most painful to the wearer.

The plan outlined in the foregoing, has the following advantages: First, it aids the teachers in carrying on organized safety instruction; secondly, it focuses the students' attention on the importance of shop safety by requiring his signature, indicating that he has had the safety instruction; thirdly, it provides a record giving evidence that an organized effort has been made to protect the student from shop accidents.

ELECTRICAL TEST BENCH BUILT BY STUDENTS OF THE COLLINWOOD HIGH SCHOOL, CLEVELAND, OHIO
Stephen H. Hurtuk, Instructor

Fads and Frills

M. C. Richmond *

THIS short one-act play is suggested by the editorial, "Abolishing the Industrial Arts," which appeared in the August, 1928, number of the INDUSTRIAL-ARTS MAGAZINE, and is written in response to the demand made by manual-training instructors for a program feature of an industrial- arts nature which would lend itself for presentation during the regular assembly exercises. It has for its purpose a graphic presentation of some of the advantages of the industrial arts.

CAST

Bill, A Modern Schoolboy
Paul, His Pal
Bill's Aunt
His Uncle Fred
Mr. Stanley, A Hardware Merchant

SCENES

PROLOG

Scene I. Living Room, Uncle Fred's House
Scene II. Mr. Stanley's Hardware Store
Description of Scenes:

PROLOG

Front curtain is pushed back to allow for small table to front center of stage with a chair to left and a chair to right of table — (Lights may be put out in order to place and take away these few pieces of furniture; otherwise stage fully lighted for all scenes.)

SCENE I — LIVING ROOM

Simple interior with following essential: Small table with lamp upon it to front center of stage; chair in back of it; door to right of stage.

SCENE II — STORE

Short counter to center of stage; wall case containing a variety of tools to back center of stage, allowing regulation distance between counter and case — case to be at least as long as counter; door to left.

Scene Note: For none of the material to be used in these scenes need the instructor go outside of his school. The easily constructed counter and wall case can be made in the school shop and the tools can be recruited from the shop toolroom.

Costumes: Everyday attire may be used by all characters. It is suggested that, for effectiveness, Bill and Paul be boys of medium height and that they wear knicker suits; that the Aunt and Uncle be above medium height, that they be attired as adults, and that Uncle Fred wear a mustache and horn-rimmed eyeglasses; that Mr. Stanley should wear either an apron or shop coat and that he powder his hair to give the effect of gray hair.

PROLOG

[*After chairs and table are placed in position on stage, Bill takes chair to* Left, *Paul to* Right. *Bill's chair faces table; he has a book in front of him and with pencil and ruler, he is drawing upon a piece of paper. Paul reads newspaper, his chair facing audience.*]

PAUL. [*Looking up from paper.*] What's that you're making, Bill?

BILL. [*Without looking up.*] It's a working drawing of a modernistic bookcase I want to make in the shop. I've finished the regular work in the shop and the manual-training teacher told me that if I wanted to make something special, I should first make a drawing of it and then he'd let me do it. [*He looks up end of this speech and stops drawing.*]

PAUL. According to this paper they're going to stop that kind of work in the schools. They say that drawing and manual training are nothing but fads and frills in education. Let me read you a few of the sentences from the paper. [*He reads from newspaper — material can be pasted on inside of any newspaper.*] If the school children today are taught just reading, writing, and arithmetic, the old three R's, that is all that's necessary. Washington, Thomas Jefferson, etc., did not spend any time on manual training and the like, while they attended school, and yet they became great leaders. [*He stops reading and looks up.*] Sounds pretty logical, doesn't it, Bill? I guess you'll have to forget your ambition along that line.

BILL. You mean my idea of becoming a mechanical engineer! You know I'll never give that up no matter what happens. Anyhow, even if a person doesn't become an engineer he can always make good use of the information he gets in the drawing classes and the manual-training shop. But you didn't read far enough, Paul. I read the entire article this morning and it has an entirely different meaning if it's read all the way through. Here, let me have that paper. [*He reaches for a paper which Paul hands him. He reads:*] The entire industrial world has changed since the men mentioned received their education. Where at one time we were engaged in agricultural pursuits, we have come to a time when we find our workers doing those tasks brought about by the invention of an unparalleled number of mechanical machines and devices. The ox-team method of transportation at one time was quite good enough for us, but today we are wondering just how long we will be content with the 150 mile an hour speed of the airplane. Will the education that was sufficient for the ox-team period be enough for this advanced day and age? The industrial-arts work makes the academic subjects come to life; it permits the pupil to experience actual life situations in the school shop; it helps the student to determine what to follow as a life's work. The value of this work has been firmly established and we need have no fears that it will be abolished in any part of our progressive country. [*He stops reading and looks up.*] There you are, Paul, I guess that crushes your logic.

PAUL. Well, I admit it does sound convincing, that is, most of it, but I must say I don't understand that last part about experiencing actual life situations and all that. It's a bit too highbrow for me.

BILL. Don't get the idea that I understand all of it either. But this is what I do know, that all the fellows get a great deal of pleasure out of the drawing and

*Red Bank, New Jersey.

manual-training work and, as the fellow said in the paper, it has helped me to choose what I want to do when I get out of this school.

PAUL. That's what *you* know, and I know that I promised my mother I'd go to the store for her and that I'd be back in five minutes, and she knows by now, if she didn't know it before, that I'm a bit negligent with some of my promises. [*He rises.*] So I'll have to say, "So long," until next time.

BILL. [*Also rises.*] So long, Paul, see you in school tomorrow. [*If dividing curtain, Paul goes out through curtain; otherwise he exits* Right.]

[*As Bill seats himself to resume work he says half-aloud:*] And I made a promise, too, with myself to finish this drawing before I got to bed.

End of Prolog

SCENE I

[*As curtain rises Bill's Aunt is seen seated in back of table carefully scrutinizing the household bills for the month.*]

BILL'S AUNT. [*Adding aloud.*] Seven, sixteen, twenty-four, thirty-two. Thirty-two dollars and sixty-four cents! [*Looking up.*] Fred will raise the roof when he sees this carpenter's bill. But it's his own fault. Everytime I want him to do something about the house it's either I won't do it or I can't do it, so I have to call in a mechanic and when he sends in his bill my husband does a war dance. [*Sounds are heard as if someone is hammering in the cellar. When hammering is stopped — it lasts only a few seconds — she continues:*] There he is now in the cellar. He took one look at the plumber's bill and said that in the future he would do all the repair work in plumbing in this house. I know he'll ruin all the plumbing in the house, but I guess I'd better let him find that out himself. If he were only the least bit handy in doing the small jobs! But every one of his fingers is a thumb and if he has any patience at all, he's been very clever in keeping it hidden from me. He says that when he went to school, they were taught to use their brains, not their hands. Well, — —

[*Enter her husband — Uncle Fred —* Right, *without coat, sleeves rolled, wrench in hand.*]

UNCLE FRED. [*Standing to* Right *of table.*] Well, it's fixed. That pipe won't leak any more.

BILL'S AUNT. What did you do with it?

UNCLE FRED. Oh, I just worked it in tighter on the end where it was leaking.

BILL'S AUNT. Then you must have worked it away from the other end?

UNCLE FRED. Sure, but the other end wasn't leaking.

BILL'S AUNT. You're right, it wasn't.

UNCLE FRED. There you go again, not the least bit optimistic. [*Looking at bills on table.*] What bills are those?

BILL'S AUNT. Well, to begin with, [*handing him bill.*] here's a very nice one from the carpenter.

UNCLE FRED. [*Putting down wrench.*] From the carpenter! What did he do around here last month?

BILL'S AUNT. Remember the board in the porch floor you didn't have time to put down? and the shelf for the pantry you didn't know how to make? and the hinges you couldn't put back on the door because you had no screw driver? and . . . .

UNCLE FRED. [*Interrupting.*] That's enough. Let me look at this bill. [*After quick look at bill.*] What, thirty-two dollars and sixty-four cents for those little jobs?

BILL'S AUNT. There were quite a few of them. Then you must figure the carpenter's time and the material. It doesn't take long to make a good-size bill.

UNCLE FRED. I can see that. This extravagance has got to stop. In the future I'll do my own carpentry work. I'm going to get my coat and hat and go down to the hardware store and get myself the proper tools. I'll put an end to these high bills. I'll do the work myself.

BILL'S AUNT. I only hope you make as good a carpenter as you do a plumber.

UNCLE FRED. [*He has turned about to go out* Right, *but turns again to wife and says:*] I'm glad *you* see some humor in the situation. You've always been after me because I wouldn't do these small jobs and now when I attempt to do something, you find it funny. But let me tell you, the fun isn't all on my side. If you could do a little cooking and a bit of sewing, things would be a whole lot easier for me. They should have taught you those things at the finishing school you went to instead of a lot of nonsense you'll never be able to use. [*He exits* Right.]

BILL'S AUNT. Well of all things!

(Quick Curtain)

SCENE II

[*As curtain rises, Mr. Stanley is standing back of counter polishing a saw. After a minute or so of polishing, he puts it on display in wall case. As he is about to turn, enter Uncle Fred,* Left, *in street attire.*]

MR. STANLEY. [*Turns and greets Uncle Fred.*] How do you do, sir?

UNCLE FRED. [*Going to counter.*] Hello, Mr. Stanley. I'd like to get some tools for carpentry work.

MR. STANLEY. [*Pointing to case.*] As you can see, we have a complete and up-to-date stock of tools. Now, what would you like, a complete assortment?

UNCLE FRED. No, no! I have a few tools of my own. I'd just like a few more.

MR. STANLEY. Suppose you tell me just what you want.

UNCLE FRED. First, I want a good saw.

MR. STANLEY. What kind do you want: crosscut, rip, back, hack, circular? Are you particular whether it's a Simmons or an Atkins?

UNCLE FRED. Hold on! wait a minute! I want just a plain saw for cutting wood.

MR. STANLEY. These are all wood saws, my friend. But if you want saws for just ordinary work, I would suggest you get a crosscut saw and a ripsaw.

UNCLE FRED. What, two saws! I thought I'd only need one. I don't want too big a bill. All right, let me have those two saws you suggested.

MR. STANLEY. [*Turns to wall case, takes down saws and places them on counter.*] Now, what else?

UNCLE FRED. I want a plane, too.

MR. STANLEY. What do you want, a jack plane, a smoothing plane, a block plane . . . .

UNCLE FRED. [*Interrupting.*] Don't go through all that business again. You're getting me all twisted.

MR. STANLEY. I'm sorry, I didn't mean to be rude. I usually take it for granted that my customers know something about the tools they have come to buy. Why, even the schoolboys who come here to buy tools know a great deal about them.

UNCLE FRED. I know that, Mr. Stanley, but when I went to school, we didn't have manual-training classes as they do today and we weren't taught anything about tools at all.

MR. STANLEY. That's too bad. [*Looking at doorway* Left.] Ah, here comes one of the schoolboys now. I'd just like you to hear him order tools. He buys something each week and in time he'll have a complete outfit. [*Enter Bill* Left *in street attire.*] Hello, Bill!

UNCLE FRED. [*He has his back to Bill as he enters, but when he hears Mr. Stanley's greeting, he turns and greets Bill.*] Hello, Bill!

BILL. [*Surprised.*] Hello, Mr. Stanley. Hello, Uncle Fred. What are you doing here?

UNCLE FRED. Oh, I just came down here to find out how little I know.

MR. STANLEY. This gentleman, who I see is your uncle, is having a little trouble selecting some tools.

UNCLE FRED. Little trouble! Your idea of size and my idea of tools seem to be about the same. I'm really all at sea about this tool business.

BILL. But what do you want a supply of tools for, Uncle Fred?

UNCLE FRED. Oh, just an idea of your Aunt's and mine. She's always been wanting me to do some small carpentry jobs about the house and I've never wanted to, in fact, couldn't if I did, and I *didn't* want to, that is, I didn't until I saw the carpenter's bill for this month. That helped me to change my mind.

BILL. You've never done any work of this sort before.

UNCLE FRED. I know that, Bill, but I thought that with the aid of some good tools the work might get done by itself without a great deal of knowledge on my part.

BILL. The day of miracles is past, Uncle Fred.

UNCLE FRED. Yes, I found that out as soon as I tried to buy some tools. [*All laugh.*]

BILL. I'd be glad to help you, Uncle.

UNCLE FRED. I guess you can, Bill. Mr. Stanley tells me that you're taking the manual-training work at school and that you know all about this tool business.

BILL. Well, I wouldn't go so far as to say that I know all about it, but I think I know what you want. [*Addressing Mr. Stanley.*] Mr. Stanley, have you a Number A completely equipped tool cabinet in stock at present?

MR. STANLEY. I haven't one on hand at present, but I can get it for you in a few days.

BILL. How will that be, Uncle Fred?

UNCLE FRED. That'll be fine; that is, if my wife doesn't find something for me to fix in the meantime. But joking aside, that will be all right. What does this cabinet contain?

BILL. It has every tool that you will be called upon to use in small repair jobs about the house.

UNCLE FRED. That's fine, but what's this business about so many different kinds of saws and planes?

BILL. You needn't bother your head about that. This cabinet has just the simplest kind of tools, and besides I am coming over to help you when you get it.

UNCLE FRED. That's real nice of you, Bill. I believe you've got the qualities that will make you a success in later life. Seems to me, that in one of our quiet moments, my wife told me you are going to be a mechanical engineer.

BILL. That's right. I got the idea from my manual-training work at school. I seem to be especially fitted for work of a mechanical nature and so I am going to follow that line of work when I get out of school.

UNCLE FRED. [*Putting his arm about Bill's shoulder.*] You've got the right idea. A fellow should do what he likes to do and what he likes best, and if your manual-training work has been enjoyable to you and it has shown you that you are fitted for that type of work, you should follow it by all means. Now, how about going home and having a little supper with us?

BILL. All right with me. I can call my mother when I get to your house.

[*They start to go out* Left.]

UNCLE FRED. Good-by, Mr. Stanley.

BILL. Good-by, Mr. Stanley.

MR. STANLEY. Good-by, call again.

UNCLE FRED. [*To Bill just before going out door:*]

UNCLE FRED. [*To Bill just before going out door:*] Do you know, Bill, you're the first one of my wife's

(Curtain)

The Preparation of the General-Shop Teacher

Victor Randel *

IN considering the preparation of teachers for the general shop, it is necessary to understand, first, what is meant by a general shop and, second, what the teacher is expected to know and be able to do.

It is generally understood that a general shop is one in which elementary instruction is given in a number of more or less related lines of work and on a basis corresponding to the interest and ability levels of the student rather than to carry instruction in one branch into advanced stages. Some of the purposes of instruction in the general shop are:

First. The development of discriminating understanding of industrial environment.

Second. Development of handy-man abilities.

Third. Providing exploratory or finding studies for the detection or discovery of interests and aptitudes.

Fourth. Providing avocational activities of adolescent youth in the pursuit of hobbies.

Fifth. And in the construction of things to possess either permanently or temporarily.

There are in actual use several types of the general shop, among which are the following: The general shop

*Sam Houston State Teachers College, Huntsville, Texas.

in which there is adequate provision for one chief activity with small provision for accessory activities.

Another type is one with generalized equipment in which projects may be planned to involve several lines of work, but without a definite series of courses of exercises in any special line.

Still another type is one which is equipped equally well for four or five lines of shopwork, and each student completes a series of activities in each, chiefly exercises, all lines of work being conducted simultaneously by the teacher, and the students shifted according to a regular schedule.

This discussion assumes that a general shop is one in which several activities may be conducted either singly or simultaneously and that the general-shop teacher should be prepared to handle the work by either of the methods mentioned in the foregoing.

To train a teacher for the general shop is a most difficult task due to the peculiar requirements of an ideal teacher for this special work. The general-shop teacher should be able to analyze a teaching problem; should have organizing ability, at least so far as teaching material is concerned; his college work should include certain general or liberal-arts subjects in order to preserve a balance between cultural and vocational subjects; he should have certain professional subjects to insure the development of a professional attitude toward the work; his special subjects should include at least three or four industrial fields plus mechanical drawing. In addition to his shop courses which are taken in college, trade experience outside of school in one or more fields should be an esssential part of his training. Prof. A. B. Mays says of the importance of the industrial-arts teacher and his needed training: "The most perfect school organization, the most expensive equipment, and the best-planned course of study that can be developed will not realize the aims of education in the lives of the pupils unless they are in the hands of well-trained, efficient teachers. The work of industrial-arts teaching to be most effective requires a twofold training not usually demanded of teachers in academic subjects; namely, the usual academic and professional education which modern conditions demand of all teachers, and in addition a special technical training in two or more industrial fields with a broad general knowledge of American industrial problems and processes."

As to the type and special qualifications of the general-shop teacher, Maris M. Proffit, specialist in industrial education, in the *Biennial Survey of Education*, 1924–26, has this to say: "The general shop is in great need of adequately trained instructors, teachers of great initiative, teachers who have had a wide range of experience in a variety of crafts, and teachers who can apply their skill in an elementary way in the construction of projects adapted to pupils of varying abilities and interests. The normal schools and colleges have not been able to cope with this new situation in supplying good general-shop teachers in sufficient numbers to meet the need. As a result, many communities have not yet reorganized their work on a general-shop basis."

Further in this same report he points out some of the difficulties which beset the general-shop teacher and suggests a possible solution for some of his troubles.

"One of the great difficulties in organizing a general shop is getting the class started. It is here that many a teacher finds he is not a general-shop teacher. No matter how well a teacher may know his subjects or how successful he may be in the manipulation of tools and materials, he must be efficient as an organizer to start simultaneously a group of probably 24 boys, in from four to six different kinds of work. The solution of this problem is the individual lesson sheet which can be placed in the hands of the pupils along with materials to meet the requirements of the problems which he is undertaking. If the lesson sheet is used and a few brief demonstrations given, the entire class can be put to work and the teacher can circulate from group to group or from individual to individual, with a criticism here, a check there, or a suggestion where most needed, leading an entire class enthusiastically into its work."

It seems clear from the foregoing, that the chief task of the teacher-training institution is first to see that the prospective general-shop teacher is provided with a wealth of actual experience in the school shop and is encouraged to gain experience in several lines of industry outside of school.

This furnishes a basis for an intelligent analysis of the work to be offered in the general shop. It is not presumed that a teacher-training department of industrial arts will give all of the training necessary to the prospective industrial-arts teacher, but only that part of training which has to do with certain shop courses and with certain professional courses which relate to special methods in industrial-arts teaching.

His professional training should include many of the following studies: Practice teaching and observation; methods of specific subjects; shop arrangement and equipment; the project method; course planning; job analysis; types of industrial-arts shops; history of manual arts and the significance of manual arts in the junior high school.

It is evident that for the training of the general-shop teacher, emphasis should be placed upon the analysis of the work to be included in this kind of shop and the preparation of appropriate individual instruction sheets. A thorough study of the various types of individual instruction sheets on the market should be made. Not only this, but much practice should be given in the making of the different kinds of individual instruction sheets, so that when the prospective teacher goes to his job he will have at hand an abundance of material and will know where he can get more to meet his special needs.

Summary

This article has attempted to show that there are at least three types of the general shop; that the teacher needs to have much shop experience both in school and outside of school in several lines of industry; and that he needs special training in analyzing industrial subject matter into units of instruction and in preparing and selecting individual instruction sheets.

It recognizes the difficulties facing the general-shop teacher and suggests special training to meet these requirements.

Trade Education as Part of a Technical High School

Edward E. Greene *

THE Arsenal Technical Schools at Indianapolis comprise two distinct types of schools: first, the technical high schools, which is fully accredited in every respect, and offers regular four-year high-school courses; second, the vocational department in which there are at present fifteen all-day state and federal aided schools, including the vocational work for girls.

In the shop department for boys there are two general divisions. In the one are the building crafts, which include carpentry, cabinetmaking, electricity, cement work, wood and metal finishing, and plumbing. In the other are the metal trades. These include the machine shop, forge shop, patternmaking, foundry, sheet metal, and auto shop. All shopwork offered is classified under three heads: prevocational, vocational, and advanced technical. Each of these has its particular objectives.

Let us consider first the prevocational. This is a two-year course in which the students spend six weeks in each of the shops mentioned. In addition to 90 minutes per day in the shop, the boys are required to spend 45 minutes in mechanical drawing. The objectives in this shop course are threefold. In the first place, the course is of particular value to those preparing for technical colleges. In the second place, it serves as a vocational finding course. Last, but not least, it is of inestimable value from the standpoint of general education, and it affords the students an excellent opportunity to become acquainted with industrial processes in both the building and metal-craft fields. Some engineering colleges give recognition to this course and grant advance standing to entering students who have had the work. This is indeed a *general shop* plan of the highest order.

CLASS IN ELECTRICAL CONSTRUCTION

Let us consider next the full-time vocational work carried on in all of the shops mentioned. These courses are two years in length. The boys spend three clock hours daily in the shop and are required to take one period of work per day in each of the following subjects: mechanical drawing, mathematics, and English. Students are segregated according to subjects and special attention is given in all cases to the correlation of subject matter. We have worked out a schedule in connection with this vocational work which is quite unique, in that the related trade work is taught by the shop teacher best equipped to teach it. For example, the auto mechanic is taught the use of machine tools by a machine-shop teacher. The student learns how to solder and weld under the direction of the sheet-metal teacher. The plumbing student learns something of house construction from actual practice in the carpenter shop, and so on. By this plan the boys spend three weeks in those shops which, in the judgment of the department concerned, can make a real contribu-

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SHEET-METAL SHOP

tion of related trade knowledge to the young mechanic. Anyone having had actual experience in the trades will readily appreciate the value of such knowledge. The vocational department also includes a full-time school of printing.

Let us consider now the advanced technical work. We find that many of the vocational students who are not planning to go to college, desire to continue in the shops after having completed a two-year vocational course. To meet this demand, two additional years of work are offered in all the shops. In this work two hours daily are spent in the shop during the junior year and four hours daily during the senior year. The shop time during the third year is shortened to allow pupils to meet high-school-graduation requirements.

The work throughout the shops is presented on a lesson-sheet plan. These sheets have been developed by the various departments and are meeting the hearty approval of both students and teachers.

The opportunity to articulate with a large technical high school such as this, affords unusual advantage to the vocational students in the way of participation in the usual activities of such an institution. The administrative organization of the school, whereby the entire student body is divided alphabetically into approximately 120 roll room groups, eliminates the possibility of what might be called class distinction. Each student, regardless of his classification, considers himself a full-fledged member of the technical high school, and this is in truth a fact, as all work done in the vocational department is given full recognition by the technical high school in the light of graduation.

AUTO-MECHANICS SHOP

Oxyacetylene Welding in the High School

Charles Fleischman *

Oxyacetylene welding is one of the most rapidly growing trades of the present time. It is entering new fields from day to day while rapidly expanding in the fields in which it has been used in the past.

Starting out in the repair field, it has entered the manufacturing industry and is replacing many processes used in the past. The sheet-metal worker, pipe fitter, and plumber are applying the art in their lines of work. The manufacture of metal furniture and art-metal work has been greatly facilitated by the oxy-acetylene process and it's companion — the electric arc. Airplane fuselage construction has been greatly improved and is now almost exclusively done by the welder.

Repairwork, in the various metals, is effectively done, and much of this work does not even require the dismantling of the machine to be repaired. The cutting process enables pieces to be fitted to the job without returning to the shop for special cutting operations. Nothing seems to be too small nor too large for the process. The cutting torch will even operate satisfactorily under water.

The rapid growth of the trade has created a demand for skilled operators. Skill can come only through practice, but the industrial welding shop has neither the time nor the equipment for this practice, even though they were willing to furnish the supplies to their helpers. The proper place for this training is in the schools where the work can be systematically organized and taught through the use of equipment that might not be large enough for the commercial shop. One or two sets of full-size equipment, in connection with a dozen small outfits, would provide effective equipment for teaching the necessary information and the theory and practice of welding.

The work is very suitable for high-school instruction. The informational material relative to metals in use in industry and the processes in producing these metals and preparing them for industrial uses is not too difficult for high-school pupils. The same is true of the production of the various gases used and the construction and use of the welding equipment. In fact, this course is one of the most interesting courses to the high-school student, and if projects, useful in the home or with a sale value, are made a part of the course, large numbers of students will be found willing to pay for all the supplies used.

Then, too, the welding equipment has reached the degree of perfection that makes it simple and perfectly safe for high-school students to handle. When installed under approved plans, no additional insurance premiums are charged. The manufacturers of the equipment gladly furnish copies of their instruction books for students, and supply instructors with the latest information regarding the trade. Their field men cover the

*Central High School, Tulsa, Oklahoma.

territory and inspect the equipment and often make repairs without charge. Some manufacturers even lend additional torches where they are given the contract for supplies.

The work lends itself very readily to small instructional units of increasing difficulty. The informational material is not all needed at the start, but is needed in small amounts in connection with the various jobs as the student advances. Much less information is needed to begin actual work than is needed in auto mechanics. Routine methods of preparing the torches for use and for leaving them, can be effectively used in teaching the proper procedure to each member of the class. Correct habits are formed by utilizing the laws of habit formation.

Tests for determining the nature of the various materials can be made interesting in a group. The expansion of heated metal can be forcibly demonstrated by heating a straight piece supported in a vise so that it must warp in order to expand, and the contraction of metal can very effectively be demonstrated if two pieces are drilled and placed on firm bolts while being welded.

The equipment for a class should include enough torches of small size to supply at least each pair of students with one. A torch for each would be much better, of course. Other equipment includes welding tables with fire-brick tops to supply space for all workers, one or more power grinders of the stationary type, one or more portable grinders, several water pails, welding goggles, and a good supply of hammers, cold chisels, files, and other metal-working tools. A blacksmith's forge will be found valuable for preheating large work, and for the preheating of smaller work, torches of the kerosene or city-gas type, will be required, as well as an air compressor for supplying a blast.

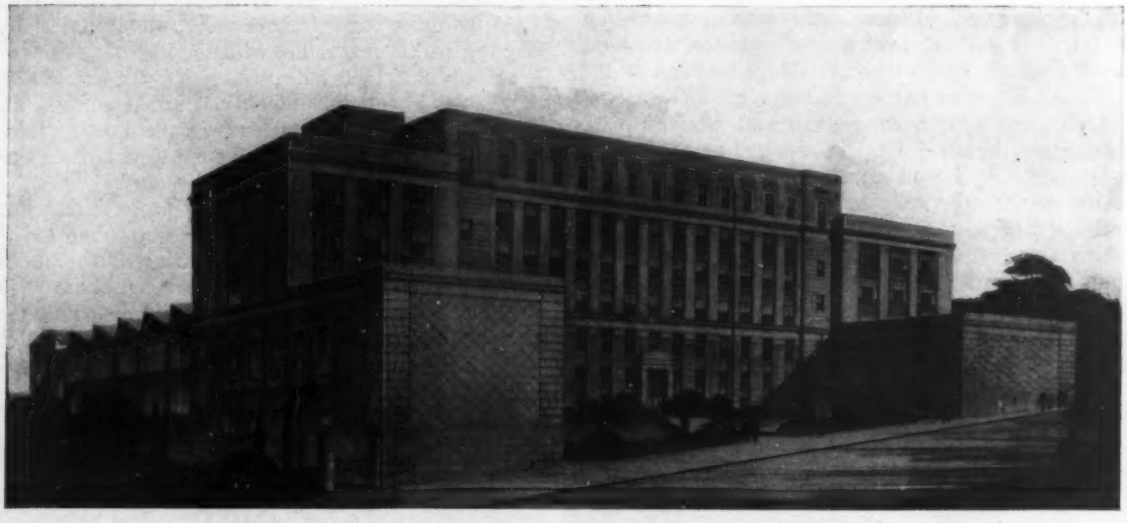
The cost of equipping the welding shop for from 16 to 24 pupils need not be excessive. The cost of the maximum recommendation would not equal the cost of equipping an ordinary machine woodworking shop, or the cost of the milling machine and planer in the machine shop.

The room problem is also more easily solved than it is for other lines of work, because less space is necessary for the same number of pupils and lighting is not so important if ventilation can be provided. Ventilation is necessary in the use of some welding rods and in preheating work.

The chief drawback in introducing this work in the high school will be the cost of the materials and supplies used in instruction. The cost of the welding gases mounts rapidly with from ten to two dozen torches burning, and if this cost is assessed on the students, those who will probably have to earn their living through the use of their hands will probably be excluded from the course. The best way to provide for such students would be to let the repairwork of the school district be done in the shop and to provide projects that could be used in the home or sold. Metal filing cabinets for the school offices would provide some projects, but much of the practice work will necessarily be done on work that will have no economic value.

The necessary supplies are oxygen gas, acetylene gas, unless a generator and carbide is provided, welding rods of assorted materials and sizes, welding fluxes, carbon rods of various sizes, carbon plates of various sizes and thicknesses, carbon paste, charcoal for preheating, kerosene or a gas supply for the preheating torch, and asbestos paper. It would be well to consult a welding-supply catalog, as it might be desirable to provide asbestos gloves, masks, and some other supplies to aid the work.

The actual course of instruction should be organized by a teacher who is familiar with the welding processes, and thoroughly knows torch manipulation. Correct habits in doing the work in the right way should be developed from the start, as it is very difficult to overcome welding habits when once formed. This is more essential in welding than in some other lines of work, because most of the work is individual and faulty methods may be unconsciously used for a long period of time. It is also easier to cover up welding mistakes than mistakes in other shops and a good practical man is needed to detect poor work.



THE NEW CLIFFORD B. CONNELLEY TRADE SCHOOL, PITTSBURGH, PENNSYLVANIA.
James Bonar, Superintendent of Buildings

INDUSTRIAL-ARTS MAGAZINE

J. J. METZ, Editor

ACCURACY AND HONOR IN VOCATIONAL EDUCATION

In the transition from the old-time apprentice system to the modern vocational school, some important factors have been evolved which were not originally anticipated. The old-time manufacturer who tried to improve the training of the learners with whom he sought to recruit his industrial force, by establishing factory classes, little realized the benefits that would accrue to his own plant and to the industry at large.

The apprentice of a former day frequently received his training through the reprimands of his foreman rather than through a systematic guidance; or else, he acquired a knowledge of his trade by imitating a fellow worker. Intelligent instruction was not the rule.

The advent of the professional instructor in the vocational field not only supplanted the foreman as a trainer in the mechanic arts, but contributed something to the apprentice student which the old-time system did not afford in quite the same degree. We have in mind here that accuracy which is the basic factor in trade training and which can be achieved only by a systematic approach to the subject.

While the old-time foreman, in his capacity as instructor, appreciated accuracy and preciseness, he had not at his command the educational aids which assured achievement in this direction. The product of the modern vocational school, therefore, excels the old-time journeyman in all-around skill and knowledge.

Then there is the factor of industrial honor, or if you will, the matter of honor and integrity in industrial pursuits. It is sometimes held that those who are engaged in an occupation involving accuracy in a high degree are inclined to exactness also in an ethical sense, i.e., the observance of accuracy in material things stimulates a sense of honor in human relations, and tends toward a finer observance of the conventions of life.

The employer of today who has some knowledge of the old-time apprentice system, and who estimates adequately the service performed by the modern vocational school, is conscious of the superiority of the one over the other. He knows that with systematic training a high order of skill and accuracy is achieved which was not possible under the old apprentice system. He regards, too, as a beneficient by-product of the modern vocational school the advanced attitude which the new recruit to his plant maintains toward his job and his employer. The young man who has mastered a vocation thoroughly and well, and feels that he can render a good service, will also realize that the equities of the situation entitle him to a proper compensation. An appreciation of the fact that relations between employer and employee rest upon observance of mutual respect, and a fair exchange of work for wage, prompts him to render an efficient service.

Thus, the modern vocational school not only trains the youth in a given trade or occupation, but instills, as well, a pride in a calling which stresses excellence of service and the sense of honor.

ONE HUNDRED YEARS HENCE

The greatest study of man is man, and this study has apparently advanced least, if we may judge by the extreme conditions of life.

In spite of this, a recent prophecy of the conditions of life one hundred years hence predicts the complete understanding of the human mind, because by that time psychology will have become an exact science whereby mental operations may be directed and controlled.

One is tempted to flights of fancy by the wonders of science, but this prophecy seems to be based on uncertain premises. The survival of the fittest seems to be one dependable conclusion of natural order, but to predict the control of the fittest mind over all mental operation, seems to lead to entire loss of initiative and originality. Such a condition is inconceivable.

Psychology is far from being an exact science, and hence we are equally far from the scientific control of life itself.

A MATTER OF DRAWINGS

Educational magazines frequently offer illustrations which are to be used by the teachers in the school shops. These drawings are usually more or less fully dimensioned. The fact that some are not fully dimensioned as they would be if they were to be used in an industrial shop, at times draws forth criticism. Whether these criticisms are merited is questionable, because the problems given are really suggestive rather than hard-and-fast delineations to be followed in their entirety.

The majority of shop teachers have the ability to furnish all of the dimensions required when once a design has been suggested, and for that reason little trouble should be experienced with any of the material presented in educational magazines, even though the constructors have not furnished all the dimensions.

On the other hand, teachers who submit material to be published in magazines with the idea that they are to be helpful to their fellow workers in the school shop, should not forget that dimensions are important, and that every one that is omitted from the drawing forces the person who tries to work from it to make independent decisions which take time and energy.

As a matter of fact, drawings of projects that have not been actually made ought not to be submitted for publication in an educational magazine. If the builder of the first article then finds dimensions that have been omitted, he can place them on the drawing at that time. He will then be sure that his drawings will be much more appreciated by those who make use of them later on.

ACHIEVEMENT

On October 14, 1829, George Stevenson and his son, Robert, were awarded a prize of £500 for their locomotive engine "Rocket" which thereafter successfully operated between the cities of Manchester and Liver-

pool. This locomotive was not the first to be built. Nevertheless, locomotives up to that time were not commonly used for passenger service. Their acceptance for this type of transportation required a great deal of foresight, ingenuity, and hard work. As in every big undertaking, it took the seer, the enthusiast, the man with an idea, to successfully solve the problem.

Shop teachers and supervisors also are confronted by problems which up to the present have not been solved, and the solution of which are needed to make something that is half-heartedly done at the present, a real success.

It is only by self-sacrificing perserverance that such solutions can be obtained, and it is only the enthusiast who ever obtains them. It is true, not everyone of those who succeed in solving a hitherto unsolved problem, is awarded a prize. Nature, however, has taken care to provide in the genius himself, that which repays him even though no material award is forthcoming. The mental calm, the realization of accomplishment, the spirit of exhaltation which goes with this realization cannot, of course, be measured with the same units as those applied to the material recompense offered for the successful performance of a task. These feelings cannot be evaluated in money, and those who work for money only will never experience the exhaltation of achieving something that was done for the sake of the attainment alone.

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VOCATIONAL INSTRUCTORS AND BUSINESS MEN'S LUNCHEON CLUBS

It is evident that the schoolmaster has in recent years been called with increasing frequency by business men's clubs to lay before them some of the problems of popular education. Thus the public press occasionally announces the fact that this or that educator will address the Rotary, Kiwanis, Optimist, Lions, or some other service club, or the members of the local Chamber of Commerce.

In this connection it is perhaps safe to say that the educator, particularly one identified with the vocational-training side of a school system, becomes a most welcome guest in circles patronized by business and professional men. The average business man recognizes in a general way the value of vocational training as an essential factor in community progress, and loyally supports the school authorities in that direction. But, he seeks at times more intimate information as to accomplishments.

The local commercial organizations, as well as the several service clubs, are concerned in the economic, civic, and social progress of the community. A chamber of commerce not only espouses the cause of the town, as a trading center, and as a community of homes, good schools, and the like, but pursues an aggressive policy in attracting new industries to the town.

The progressive citizen knows that employment and a payroll make for economic stability. More factories mean more employment, more payroll, and more prosperity, and these in turn mean more patronage for the merchant and the banker. They affect the material well-being of the home, and any discussion on the community's industrial ambition logically brings into play the question of vocational training.

An industrial enterprise about to seek a location in a town will not only require accessible factory sites, good streets, water, gas, and sewage connections, but also for a peaceful, industrious, and skillful labor constituency. Its executives will want to know whether the community is industrially minded. Do blazing factory chimneys, soiled overalls, and the paraphernalia of industry command the respect to which they are entitled? Do the local schools foster vocational training?

These are the thoughts which run through the minds of the progressive citizenship concerned in the economic stability and material progress of the community. Thus, the estimate placed upon the school system is frequently measured by the contribution it makes in this direction.

It is well, therefore, for the vocational schoolmaster to avail himself of the opportunity when afforded to openly espouse the cause which he serves before representative bodies of the citizenship. He is always certain to receive a warm reception, a respectful hearing, and a hearty approval of the educational labors performed by him and his associates.

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WHAT IT COSTS

According to the report of Dr. J. C. Wright, director of the Federal Board for Vocational Education, on the expenditure of federal, state, and local funds for vocational education for the fiscal year ending June 30, 1929, a total of $27,474,305.86 has been expended. Of this amount, $6,878,529.71 was paid by the Federal Government, while the balance amounting to $20,595,776.15 was supplied by state and local governments.

It is well for all engaged in vocational education to know of these expenditures. The amount is quite large, and many carping critics will find ample opportunity to compare the present with the past, when such unheard-of expenditures for vocational education were unknown.

Those interested in vocational education should be able to defend the faith that is within them. The $27,000,000, large as that amount may seem, and actually is, becomes trifling when compared to the results that may be expected from it in the lives of those whom it has affected. To accomplish best results, of course, efficiency must ever be the watchword, and although much has been accomplished in this direction, vocational education must strive for increasing efficiency to justify the expenditures that are made in its name.

One of the points emphasized by Dr. Wright in his report, is that at no time during the past thirteen years has the entire allottment for vocational education available to the states, been fully utilized. This proves that some states are not yet fully alive to the value of this type of education.

The steady increase in the ratio between the amounts expended by the state and community for this form of education per dollar for federal money contributed, shows a healthy growth. This ratio, which was 2.54 in 1926 has risen to 2.99 during the past year, shows that increasingly more local interest is shown in vocational education, and this after all is the reason for the existence of the federal subsidies.

Vocational Building-Trades Work

*Anderson G. Long**

AT the Lee's Summit High School, manual training has been one of the most popular courses for many years. It was started as a regular two-hour course in 1910 in a small basement room with eight benches, and only a meager supply of tools. Now it has grown into a thriving department and occupies a spacious room, a glassed-in finishing room, and a private office in a new modern school plant.

In the spring of 1928, the idea was conceived of making the department vocational. This was thought necessary because of the growing demand for practical constructive work from the manual-training department. It was also thought that the quality of construction and the appreciation of proper home construction depends wholly upon the education given to those who will some day be home builders or home owners. The course decided upon was to be developed about the building trades. Enough equipment was added to the department to supply fifteen boys in a course of carpentry, wiring, brickwork, painting, drawing, and shop mathematics. Fifteen boys were enrolled in the class ready for the start of the school year of 1928–29. In order to make the course thoroughly practical, it was decided to start with the actual construction of a house.

As soon as the citizens of Lee's Summit understood the nature of the new course, offers for the erection of four modern homes were proffered to the class. The first two of these were accepted with the understanding that the home owner was to furnish all materials, while the work on the house, with the exception of the plumbing and heating, would be done by the class.

This method relieved the school at once of all financial obligations. It was further stipulated that the school was to receive 10 per cent of the cost of materials used on the home, and that 30 cents per hour was to be paid to the students for all overtime and Saturday work.

Then when school started in September, the job of remodeling the home of a local banker also was offered as a class project. This also was accepted because it was a rebuilding job and offered much practical experience for the boys along with the two new jobs.

The plans of these three jobs were completed during the first two weeks of school. One of the jobs called for the erection of a seven-room modern home, the other was for a five-room home, and the remodeling job

*Lee's Summit, Missouri.

CARPENTRY WORK DONE BY STUDENTS OF LEE'S SUMMIT HIGH SCHOOL

Fig. 1. House No. 1—5 Rooms
Fig. 2. House No. 2—7 Rooms.
Fig. 3. Cutting Rafters for House No. 1.
Fig. 4. Raising the Upper Partitions on House No. 2.
Fig. 5. The Remodeling Job.
Fig. 6. Students at Work.

called for the addition of two rooms and the adding of some built-in features.

To accomplish such a volume of work required an organization which would function. To this end, the class of fifteen boys was divided into three groups of five boys each. Each group selected one boy as head of the group. Thus each group had the same number of boys, and each had a job. The three boys at the head of the groups become in a large measure responsible for the planning of the work to keep every man in the group busy. It is the foreman who sums up the amount of work to be done, the amount of material used each day, and it is he who must furnish the instructor a written statement of the needs for the next day's work. Each individual boy is required to fill out a daily job sheet which then forms a definite record for the instructor, and a check system on the boys' work. The heads of the three groups are changed periodically.

As one group gets a little behind or needs some extra help for a few days, the group farthest ahead goes to its aid. At the mid-term the rebuilding job was completed and both new houses were completely inclosed, wired, and lathed ready for plastering.

Throughout this time, there was always a generous supply of odd jobs available for any group which had to be idle for a few days.

The instructor's duty under this system is largely one of inspection and leadership. Each individual student's work must be checked with his job ticket and he must be set right on his mistakes. The planning ahead must be done by the teacher. Group and general meetings must be held to take up and explain each new phase of the work.

The plan has worked out very well. It contained a great deal of student interest because the students feel that they are confronted with a real labor situation. The work of the course thus resembles an ideal situation, since the actual requirements of life rather than an artificial school project is the basis of the instructional work.

DAILY JOB SHEET

Name..... Date.....
Job .....
Tool Box No.....
Started Work at.....o'clock, Quit at.....o'clock
Type of Work .....
.....
Tools required .....
.....
Tools returned .....
.....
Kind of Materials Used. .....
.....
What Part of Building.....
.....
If Nails Were Used, What Kind and Size.....
.....
How Much Material Was Used.....
How Much Overtime.....
.....
Can I honestly say that I have carried on only such conversation as pertains to the job?.....
Have I not wasted my opportunity or that of my classmates? .....
.....
Remarks
File This Sheet in Instructor's Office EACH Day

An Interclass Shop League

*William P. Daly**

COMPETITION does a great deal toward increasing activities of all kinds. It is found in every line of endeavor, athletic, commercial, industrial, charitable, and social activities, between families, communities, states and countries.

*Bridgeport, Connecticut.

OFFICERS:

.....Capt. .....Second Lieut.

Shop Class Report

To be Submitted Weekly to the Class Teacher of Each Group.

Date.....
School .....
Teacher .....
Deportment .....
Industry .....
Workmanship .....
Absent Tardy
Time of Arrival.....
Time of Dismissal.....
.....
Shop Teacher

RATINGS:
E—Best that could be expected of a class.
G—80-90%. F—70-80%. U—Below 70%.

Fig. 1

There is no reason, therefore, why methods of comparison should not work successfully in the school shop. To stimulate enthusiasm in shopwork, the following competitive system has been worked out, and has been found to work quite successfully. Each class is organized during its first period in the shop. The boys choose a captain, a first and second lieutenant, and a foreman. The duties of these officers are then discussed and fixed. When the classes are dismissed from the shop, a record slip (see Fig. 1) is given the captain for presentation to the principal or to the home-room teacher. This slip states the class record for that session in regard to deportment, industry, and workmanship. The grading marks E–Excellent, G–Good, F–Fair, and U–Unsatisfactory, are used. A record of these marks are posted in a conspicuous place in the shop, so that the different classes can compare their standings. In this way an interclass shop league is formed. Figure 2 shows how the interclass shop-league standings are kept. Instead of using letters, each letter is represented by a certain number. For instance, E has been given the equivalent of 5 points and G, 3 points. To discourage doing work which merits a grade of fair or unsatisfactory, 3 points are deducted for an

F, and 5 points for a U. At the dismissal of each class, the interclass shop-league chart should be brought up to date. At the end of each marking period, which is five weeks in our school system, 3 honor cards are given out. These cards, shown in Figure 3, are of three colors; red for first honors, blue for second, and white for third. The honor card bears the date, name of school,

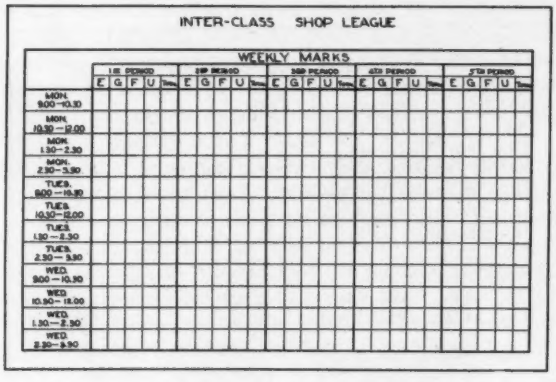

FIG. 2

The marking of this interclass shop-league chart should be done in pencil, so as to make it easier to change the number of E's, G's, F's, and U's, after each class session.

The following shows how a given class record is evaluated at the end of a given marking period.

Grade	E	G	F	U	Total
Equivalent Value in Points	+5	+3	−3	-5	
Frequency of Grades Earned	5	7	2	1	
Value of Grades in Points	+25	+21	−6	−5	35

The chart shown in Figure 2 is made out for only three days of the week. The reason for this is that the teacher is working at two shops. Three days per week are spent at one of these shops and two days at the other. For this reason there is a separate chart for each shop.

room number, grade, honor rank attained, number of classes entered in contest, officers names, instructor's signature, etc. If a tie is reached between two or more classes, the average of the individual marks made by the various students in these classes is found. The class having the highest individual average takes the highest position.

As a further aid to the promotion of enthusiasm, the interclass shop honor chart, shown in Figure 4, may be used. This chart contains the names of those classes which have received honor cards. Each honor card is equivalent to a certain number of honor points. Thus, the red honor card is equal to 15 honor points, the blue card equal to 10, and the white, or third honor card, to 5 honor points. With the use of this honor chart the student's enthusiasm continues even after the honor cards have been received. It is well, as a final step at the end of the year, to give three honor certificates or pennants to the classes with the highest standing.

School..... Room..... Grade.....

Shop Honor

THIS CLASS ranked THIRD, among.....classes from ....., taking Manual Training at the .....
Date .....

Instructor

.....First Lieut. .....Foreman

Fig. 3

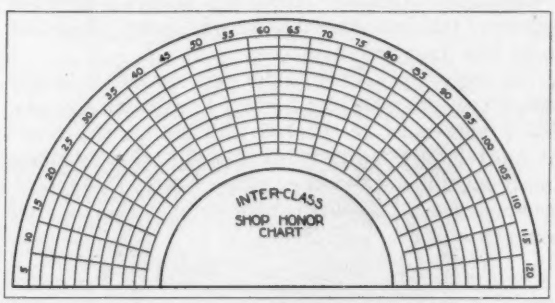

FIG. 4

This chart may bear the school colors of the school for which it is intended. Upon it are placed the room numbers of the classes that receive honor cards. If more than one school is using the same shop, it is advisable to place the first initial of each school before the room numbers.

Thus, if room No. 20 at McKinley School receives the first honor card, the symbol M20 is placed under the number 15 on this chart. This symbol remains there, and if the same school receives a third honor card at the end of the next marking period, their room symbol (M20) would be placed under the number 20, because the third honor card gives them an additional 5 points to the number which they already had.

Record Chart

*R. H. Grob**

THE record chart described herewith is being used in my shop classes because it gives me accurate data on each student and on each process that he has performed while in my class. Not only that, but it also shows in what type of work he excels in that particular subject. For instance, a boy may be very good in assembling or in finishing and yet be very poor in some of the other processes covered by the chart. When a boy selects an occupation, it is to his advantage and to the advantage of the employer to know what type of work he is best fitted for. If an employer were to ask for a boy for his finishing department, it would be a very easy matter for me to tell which boy, according to my estimation, would be best suited for that job by merely referring to my record chart. Record charts in the vocational schools or in any other school should be more than merely a record of standings or averages. It should be a record of abilities in all the phases of his work. I say abilities because a chart of this kind covers a wide range of abilities as may be readily seen by checking it over.

This record also goes one step further. The employer is not only interested in the ability of his workers, but he is also interested in that worker's character. Factors dealing with character are recorded under a separate heading, namely, "Character Traits." Character traits are again subdivided into five separate

*Vocational School, Sheboygan, Wisconsin.

traits. At the end of each week the pupil is given a mark on each of the traits in the column corresponding with the week of that particular quarter.

CABINETMAKING

Name of Pupil _____ Date _____

CHARACTER TRAITS

WEEK NUMBER	1	2	3	4	5	6	7	8	9	10
Attitude toward work										
Conduct										
Care of equipment										
Attitude toward fellow worker										
Neatness										

WORKMANSHIP TRAITS

WEEK NUMBER	1		2		3		4		5		6		7		8		9		10	
	P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S
Project number																				
Bill of materials																				
Selection of stock																				
Surfacing																				
Cutting to size																				
Squaring up																				
Sanding																				
Assembling																				
Retouching																				
Selecting a finish																				
Finishing																				
Lathe work																				
Average for week																				
Test average for week																				
Final average for week																				

RECORD CHART DESIGNED BY R. H. GROB

Ability traits are recorded under the heading of "Workmanship Traits." This is also subdivided into many separate divisions. In the "P" column, all processes worked on by the student for that week are recorded. The pupil receives a check mark (√) after each at the end of every day he is present. This gives the instructor a method of checking up to see if a boy is receiving instruction on all the processes. It eliminates the possibility of a boy doing only the type of work that requires the least effort and thereby neglecting other important factors.

The "S" column may be used in giving the boy a standing at the end of each week for each process. This is only in fairness to the boy, for he should not be graded only on the processes in which he is best, nor only on those in which he is very poor, but he should be graded on all processes separately so that an average standing can be given him each week.

The charts should be kept on file for future reference so that the teacher is able to give his estimate of a boy even after the student has completed his course and passed on to another class or has left the school.

SLOW LEAKS

Laurence Parker, Kansas State Teachers College, Pittsburg, Kansas

We were trying to reach a distant town before time came to camp for the night. This town had been recommended to us because of its exceptional tourist camp. As it grew late in the afternoon we found that the left front tire was getting soft. We stopped at the next service station and filled it with air again. By the time we reached the next town we had to stop and pump it up again. It was just too slow a leak to compel us to change tires and it was leaking air just fast enough to be a bother and a cause of delay.

Finally as the sun went down we "got busy" and changed tires. This was done at the suggestion of the "skipper" who tactfully suggested "you haven't time to keep this old tire full of air. We have set out to arrive somewhere and not to keep a leaky tire filled."

We were reminded of this incident a few weeks later when a superintendent of schools told us of a manual-training man in his organization who was proving to be a great bother to him. As he described the symptoms, he reminded us of the leaky tire.

"The man has ability," said the superintendent, "but he lacks courage. He is afraid of shadows. He gets the idea that I have it in for him. He is afraid that the principal does not like him. He fears that other instructors in the department are cutting around him. He worries for fear he is not making good.

"In some ways, he would make a good head for the manual-training department, but in that position he would have to have his courage pumped up too often. I am too busy a man to have to stop every day or so, pump up his courage and restore him to usefulness. When the appointment is made of a department head, it will be a man who has no slow leaks."

SHOP EXERCISES

Exercise training has no more place in an efficient trade school than it has in an efficient plant.—*Charles R. Allen.*

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

CHILD'S COSTUMER

William A. De Vette, Wilson Junior High School, Erie, Pennsylvania

(See Supplement No. 169)

A gift which will be appreciated by a little brother or sister, and which at the same time will help in teaching him or her to be neat, is shown in Supplement No. 169. The child's costumer shown in this supplement is simple, yet staunchly constructed. It not only provides opportunity for hanging up clothing, but also for storing shoes.

The material required for the construction of this child's costumer is as follows:

Bill of Material

2 pc.	1¾ x 1¾ x 16	Poplar, Base
1 pc.	1¾ x 1¾ x 52	Poplar, Post
2 pc.	¾ x 4 x 10	Poplar, Brace
2 pc.	¾ x 4 x 6	Poplar, Shoe-Rest Support
2 pc.	¾ x 3 x 7½	Poplar, Shoe Rest
7	2½ No. 10	F.H.B. Screws
4	2 No. 10	F.H.B. Screws
4	Clothes Hooks, purchase as desired	
	Screws (for hooks), included with the above	

Construction

Base. Saw the stock to slightly more than the required width and length and plane to exact over-all dimensions. Lay out the shape for each of the two pieces, being careful to lay out opposite dados for the cross-lap joint. Saw out the form on the band saw and cut the joint with a chisel. Fit the two parts together and bore and countersink five 3/16-in. holes from the underside, one at the center of the cross lap and the others 2¾ in. away on each arm.

Post. Rip the stock to slightly more than 1¾ in. square and plane to size on the jointer. Lay out the 1-in. square on the end, measure off the length of the taper and plane this on the jointer also. At the large end locate the center and bore a 3/32-in. pilot hole 1¼ in. deep for the screw. Chamfer the small end 3/6 in.

Braces, Shoe-Rest Supports, and Shoe Rests. Lay out the pieces, and make certain when laying out the part of the shoe rest which fits around the post that the correct size of the post has been maintained. Cut out the parts on the saw. Bore and countersink 3/16-in. holes 2 in. from the upper edge of the braces and shoe-rest supports, and also bore and countersink 3/16-in. holes at the center of the upper surface of the shoe rests.

Smooth up all curved surfaces with a rat-tail file and clean up all surfaces with sandpaper.

Assembly. Screw the base and post together using 2½-in. No. 10 f.h.b. screws. Locate the braces and clamp them in position with a screw clamp. Fasten each with a 2-in. No. 10 f.h.b. screw at the top and a 2½-in. screw through the base, boring 3/32-in. pilot holes before sinking the screws. Fasten the shoe-rest supports in the same manner and also the shoe rests. Fasten the clothes hooks in place where desired. They should be removed for finishing, however. The costumer may be finished in any manner desired; Duco, two flat coats and one gloss, being preferred by the writer. After drying thoroughly, replace the clothes hooks.

A JOB SHEET THAT HELPS TO DO THE TRICK

W. R. Challoner, Appleton, Wisconsin

(See Supplement No. 170)

After trying many forms of job sheets and observing the difficulties the beginning student finds in understanding them, and his apparent inability to visualize and obtain the information that is necessary to help with the work, it was decided to try a combination of picture and print, as shown in supplement No. 170.

This job sheet has now been used for some time with good results. It is supplemented by demonstration and lecture and then by individual demonstration.

Armed with this sheet, it has been found that the student can assist himself with the work, and that he sometimes uses the sheet as a reference on similar jobs which follow.

With reference to item 19 on the sheet which is somewhat unusual, it becomes necessary for the instructor to spin the end as it requires some experience to obtain a good job. If you wish to try this spinning, take a piece of carbon tool steel to suit the size of your tool post; grind a radius on one end and polish it, then harden the tool as hard as it will stand, and polish. Place the handle in the chuck with about ¾ in. projecting. Place the tool in the tool post, and put a generous supply of white lead on the job to keep the tool from tearing the material. Have the lathe running on open belt at a medium speed. Bring the tool in contact with the job about three sixteenths of an inch from the end and press hard enough to cause the metal to flow or spin. By repeating this several times the end can be closed entirely. With a little experimenting on this operation, a good job can be secured.

In summing up the advantages of this job sheet, attention is called to the following:

1. It provides an opportunity for practice on the lathe without much material being wasted.
2. The job is useful when completed.
3. It can readily be sold, so that the cost of the material is returned to the school.
4. It provides an opportunity to acquaint the student with the difference between machine steel and tool steel.
5. It provides an opportunity to perform a number of fundamental operations on the lathe.
6. It gives the student a chance to learn the names of the tools and at the same time furnishes a picture of the tools so that they will be recognized at the tool crib.
7. It ties the job, operation and information together on one sheet of paper in a handy form for shop reference.
8. It gives the student practice in reading a drawing.
9. The job sheet serves as a reference on following jobs of similar nature.

TRACING SUPPLEMENT No. 169,
THE INDUSTRIAL-ARTS MAGAZINE,
MARCH, 1930

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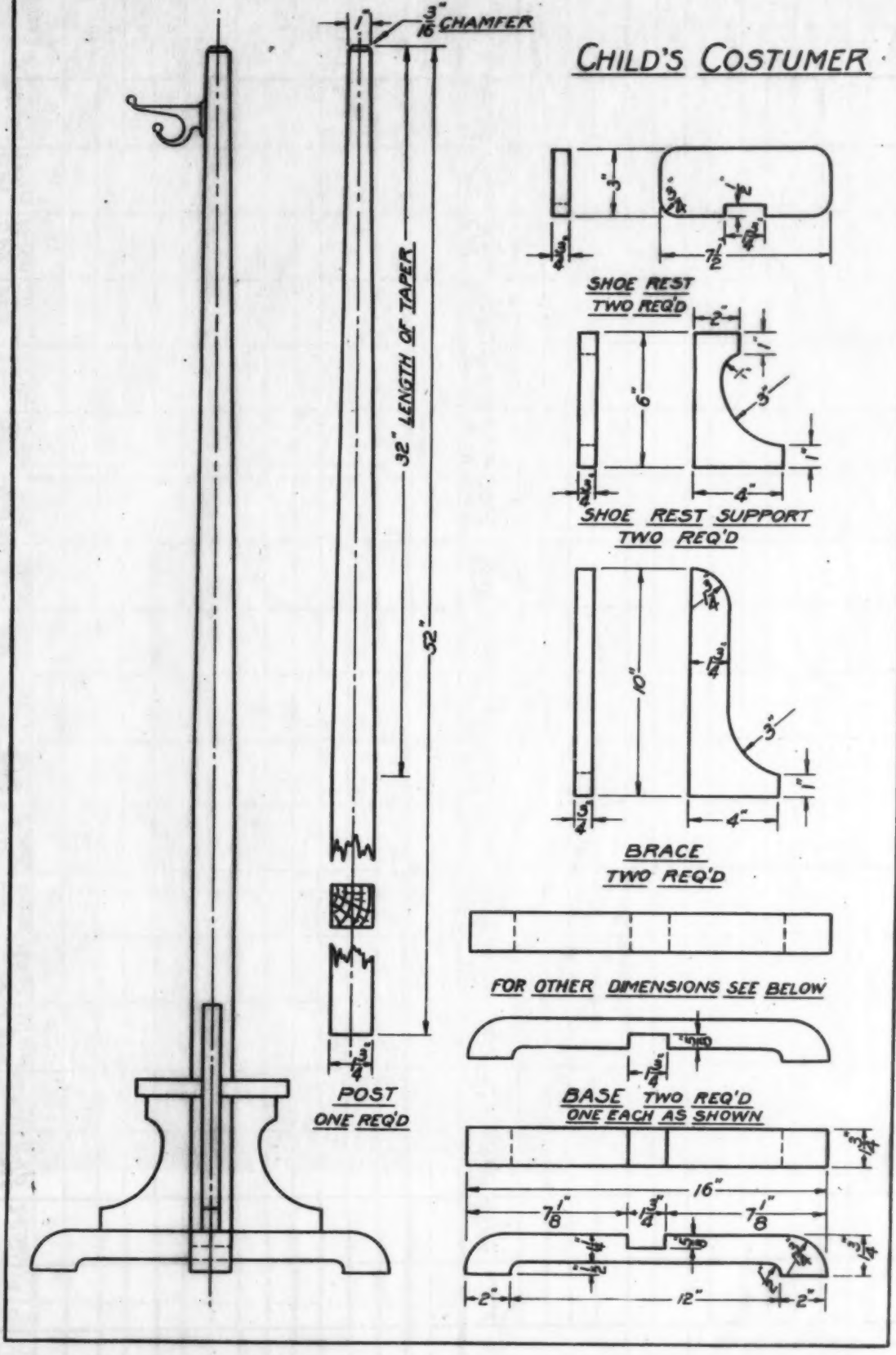
CHILD'S COSTUMER



Designed by William A. De Vette, Erie, Pennsylvania

For Description See Page 104, Industrial-Arts Magazine, March, 1930

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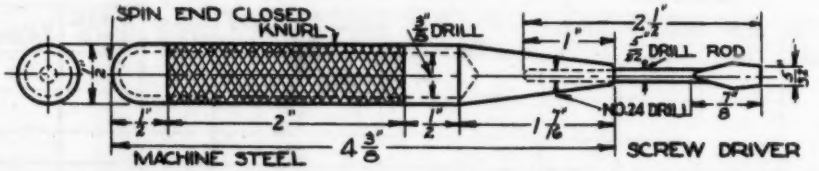
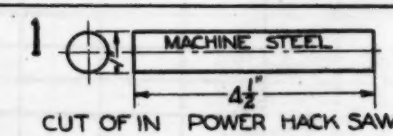
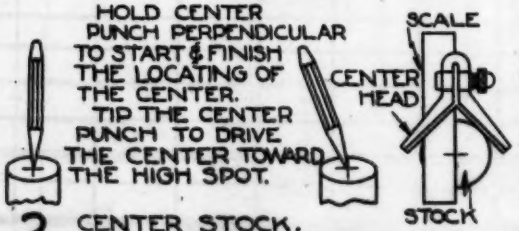


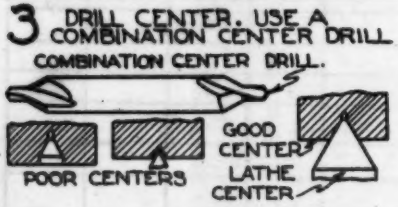
1 CUT OF IN POWER HACK SAW



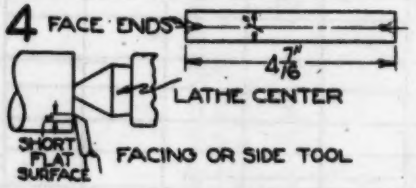
2 HOLD CENTER PUNCH PERPENDICULAR TO START & FINISH THE LOCATING OF THE CENTER. TIP THE CENTER PUNCH TO DRIVE THE CENTER TOWARD THE HIGH SPOT. CENTER STOCK. USE A CENTER HEAD.



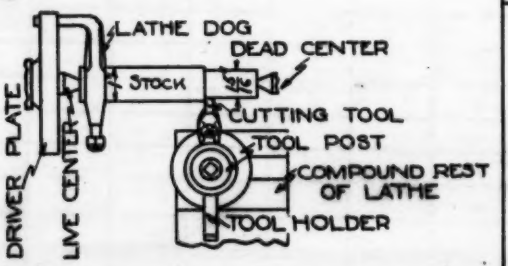
3 DRILL CENTER. USE A COMBINATION CENTER DRILL.



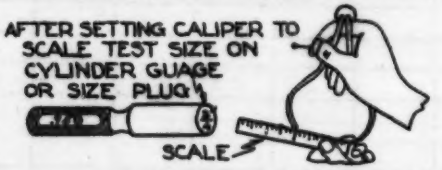
4 FACE ENDS



5 TURN TO SIZE



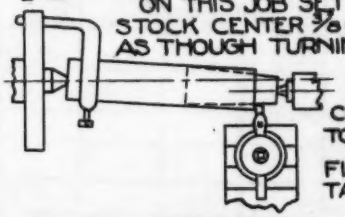
6 TO 13 SAME AS NO. 5 REMOVE 1/16 EACH TIME USE A SCALE & CALIPER TO CHECK SIZE



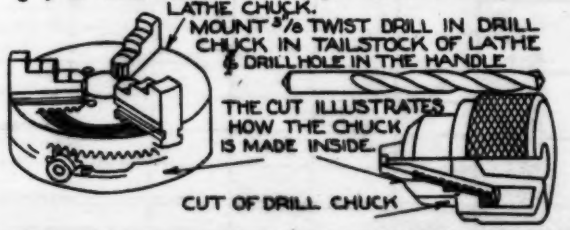
14 FILE & POLISH. HAVE CENTER LOOSE. RUN JOB AS FAST AS YOU CAN.

15 KNURL HANDLE. USE COARSE KNURLING TOOL.

16 TURNING TAPER ON THIS JOB SET OVER TAIL-STOCK CENTER 3/8 & PROCEED AS THOUGH TURNING STRAIGHT. PUT LATHE CENTER BACK TO STRAIGHT. FILE & POLISH TAPER END.



17 PUT A COPPER SLEEVE OVER KNURLED PART OF JOB TO PROTECT IT & CHUCK IN UNIVERSAL LATHE CHUCK. MOUNT 3/8 TWIST DRILL IN DRILL CHUCK IN TAILSTOCK OF LATHE & DRILL HOLE IN THE HANDLE. THE CUT ILLUSTRATES HOW THE CHUCK IS MADE INSIDE. CUT OF DRILL CHUCK



18 DRILL NO. 24 HOLE IN TAPERED END OF HANDLE.

19 MOUNT HANDLE SAME AS IN NO. 18 & USING A PIECE OF VERY HARD TOOL STEEL AS A BURNISHING OR SPINNING TOOL. CLOSE END OF HANDLE & POLISH.

20 FORGE BLADE OUT OF TOOL STEEL; USE DRILLROD. HEAT END OF HANDLE RED HOT & PUT BLADE IN PLACE. BLUE HANDLE & COOL IN OIL. HARDEN & DRAW THE TEMPER IN BLADE. POLISH BLADE & PART OF HANDLE.

STUDENT_____

DATE_____

TIME IN HOURS_____ GRADE_____

LATHE EXERCISE
JOB
SCREW DRIVER

Job Sheet for the Machine Shop, Devised by W. R. Challoner, Appleton, Wisconsin

For Description See Page 104, Industrial-Arts Magazine, March, 1930

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MARCH, 1930

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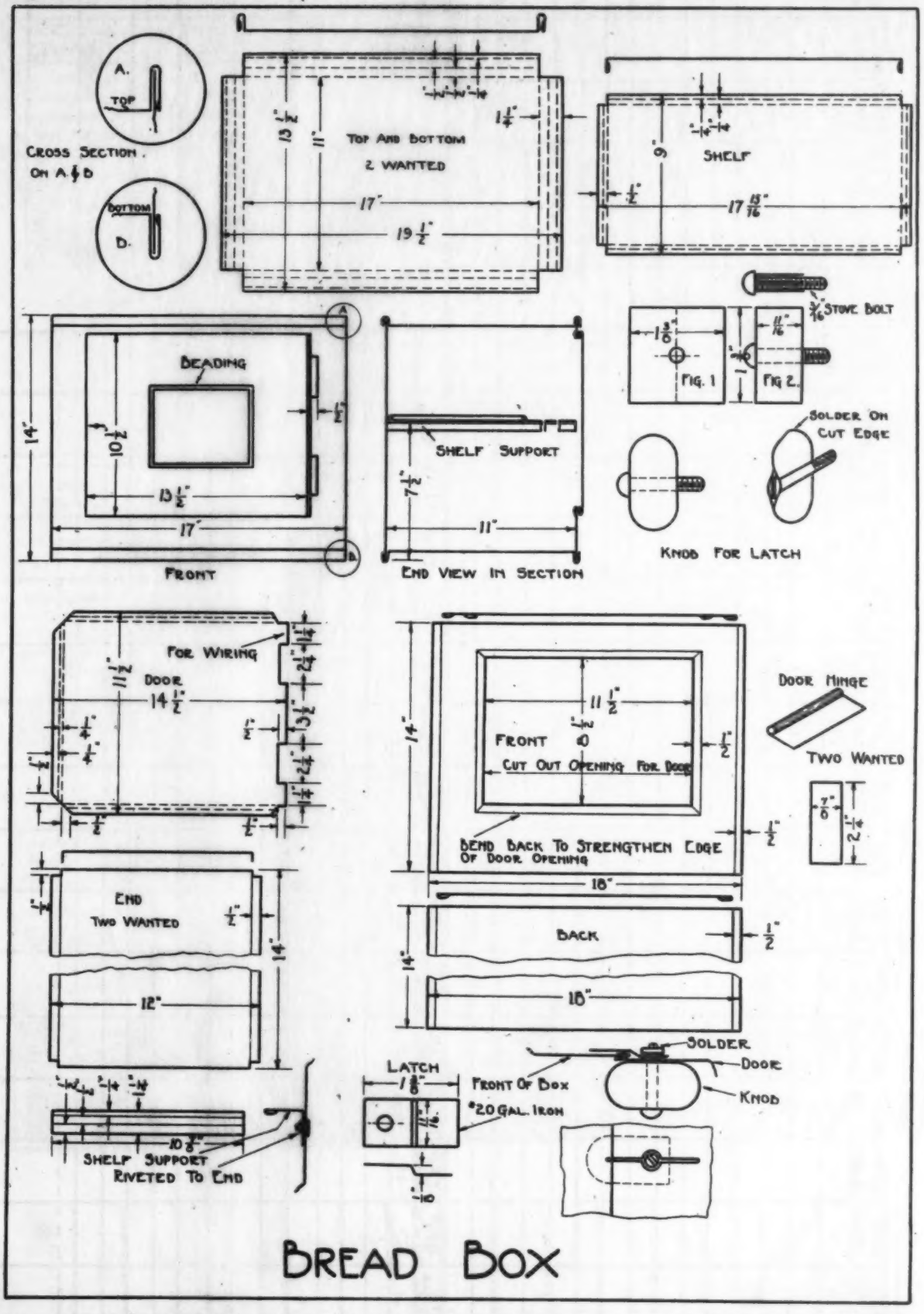

BREAD BOX

Designed by Harry W. Kroll, Buhl, Minnesota

For Description See Page 104, Industrial-Arts Magazine, March, 1930

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INTER. WOODWORK
CLIFFORD B. SMITH

GLUE JOINT

UNIT INSTRUCTION SHEET— W-113

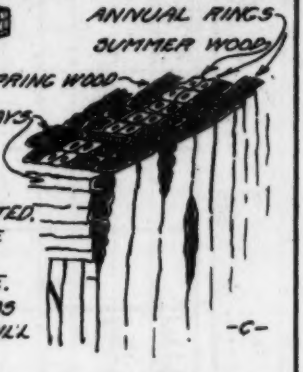
NOTE ANNUAL RINGS

-A-

THE SKETCH AT -C- SHOWS WHY THE ANNUAL RINGS CAN BE SEEN. IT IS DUE TO THE DIFFERENT CELLS

-B-

THESE CELLS SHOW WHY CLUE HOLDS



-C-

—AN EDGE TO EDGE GLUE JOINT—

1— HEART AND SAPWOOD SIDES ALTERNATED.
2— GRAIN PLANES SMOOTHLY, THE SAME DIRECTION ON EACH PIECE.
3— THE BETTER SIDE UP ON EACH PIECE.
4— MARK EVERY PIECE AND EACH JOINT AS SHOWN ABOVE, SO THAT NO MISTAKE WILL BE MADE WHEN GLUING.

WHAT IT IS— A Glue Joint or Edge to Edge Joint is one in which the pieces are joined on their edges, and usually held only by means of hot glue.

Sometimes a spline or dowels are also used to provide greater strength.

TOOLS— Jack, fore or a jointer plane (depending on the length of the wood), try square, straight edge, marking gage, bar clamps, hand screws.

DIRECTIONS— 1— Arrange the pieces to be glued in order. In doing this there are three things to consider.

a— the figure, grain or markings of the surface. This is very important in cabinet making.

b— that each board planes smooth in the same direction. Note the arrows on each piece in sketch -A-

c— that the heart sides of the different pieces are alternately up and down. See -A-

2— Mark and number each piece as shown at -A-. The figures 1, 2, 3, 4, etc. should be made plainly so that there will be no doubt or hesitation when gluing.

3— Joint the edges to be glued. This will require attention to these points:-

a— Position of plane. Have full length of plane on edge of wood. See -G-. Press down firmly on the plane during the stroke. Pick plane up at end of stroke.

b— Plane until you have a full length, full width shaving, like lace.

c— Test edge for squareness at the middle only.

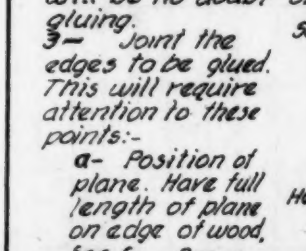
4— How to tell if you have obtained a glue joint.

a— Place the two pieces that form joint -A-, for example, together edge to edge. See that both sides fit perfectly.

b— Now press with all your weight at one end as shown at -H-. The joint should not open.

c— Test for straightness as at -L-.

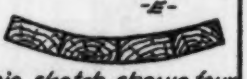
5— When all joints are completed, warm the wood, set the clamps, test the glue and with a helper quickly apply the glue and assemble the work. Remove surplus glue when jelled.



-D-

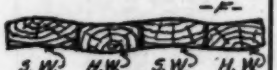
Above is shown a log sawn into boards. As the sapwood contains more moisture and is composed of thinner walled and less mature cells, it shrinks more than heart wood. This causes warp in wood

-G-



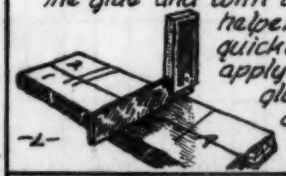
-E-

This sketch shows four pieces each one having its sapwood side up. Since each sapwood side will become hollow, the glued-up board will have a decided warp, as shown.



-F-

This sketch shows how the same four pieces could be glued together and remain without warp in the large board although each individual piece warps as much as at -E-



-L-

-H-

QUESTIONS— Wood, as it appears under the microscope, is shown above at -B- and -C-. Why is it necessary that the surfaces of a glue joint make perfect contact? Why do we rub the surfaces together after applying glue? Why is it that we cannot fill up a poor joint with glue? Then is glue itself, in a sheet, very strong? When it is like a million tiny nails penetrating the wood, is it then?

Designed by Clifford B. Smith, Buffalo, New York

ADVERTISING PAGES REMOVED

BREAD BOX

Harry W. Kroll. Buhl, Minnesota

(See Supplement No. 171)

The bread box serves admirably as an elementary sheet-metal problem. The size of the piece will often bear direct relationship to the size of some boy's ambition.

1. Lay out the bottom, top, and ends. Cut to required dimensions. The first and second fold of the top and bottom may be made on the bar folder and the third, the ½-in. closed fold, on the cornice brake. If a cornice brake is not available, this may be done with two blocks of wood cut to the lengths of the fold, and a vise. Slip the closed fold between the blocks and turn over to a right angle. Repeat this operation for the other three closed folds. The ends are completed by turning the ½-in. allowance to a right angle with the body. This operation is performed on the bar folder.

2. Proceed to lay out back and front, and cut to dimensions. Fold ½-in. closed fold on both ends of back and front as shown in the drawing. This completes the work on the back. The front is ready for cutting out the door opening. After removing the portion 8½ by 11½ in. and having slit the four corners on the lines as shown, bend ½-in. material to a closed fold to the same face with the end folds.

3. Cut out and fold ¼-in. double folds on three edges of the door. Fold in the same direction for No. 10 wire on the remaining edge as shown.

4. Lay out two door hinges and fold one edge for No. 10 wire.

5. Cut out the door knob. Bend on center line and insert a 3/16 by 1-in. stove bolt. Round off ends of knob as shown.

Press the material down around the stove bolt with a pair of pliers, and solder the edges by sweating in the solder between the two pieces. Solder also at the head of the stove bolt.

6. Cut out the latch from No. 20 material, and fold to the proper shape.

7. The shelf supports are cut out and folded as shown. Rivet one to each end measuring 7½ in. from the bottom of the end to the top edge of the support.

8. The shelf is then cut out and folded.

9. To make the finish less expensive, thin out good varnish and use it as a vehicle for the aluminum bronzing powder. As a suggestion, cover the beaded area with gold and stencil the letters "Bread" in red. For stenciling, use an ordinary 1-in. brush. Wind a ½-in. strip of cloth around the bristles until the end of the brush appears a compact mass. Place some of the heavy enamel from the bottom of the enamel can on paper. Hold the brush vertically, and dip into this heavy material. After a few preliminary taps with the brush on paper, tap through the stencil on to the surface of the box using very little material, as it must not run under the stencil. A little practice will materially aid in good stenciling.

A larger box may be made using the same type of construction only increasing the height of the sides, front, back, and door dimensions.

TYPICAL JOB SHEET FOR THE AUTO SHOP

Ray F. Kuns, Cincinnati Ohio

Fitting Ford Model T Piston Rings to Pistons

Piston rings used in the Ford Model T are what are known as eccentric rings; that is, the point opposite the ends of the rings is approximately twice as thick as the material in the ends of the rings. The ring is made in this form in order to equalize the cylinder-wall pressure.

The piston rings are provided solely for the purpose of retaining the gases in the combustion chamber. This holds true with reference to the incoming charge of fuel as well as the exploding gases which develop the power. There are several places at which loss of compression occurs around the ring. One of these is past the outer surface of the ring. This is not likely to occur if the tension of the ring is good. Perhaps the greatest loss is that which occurs around the ring; that is, gas finds its way between the top of the ring and the ring groove, passes around the back of the ring and finds its way out under the ring and on down into the cylinder along the piston.

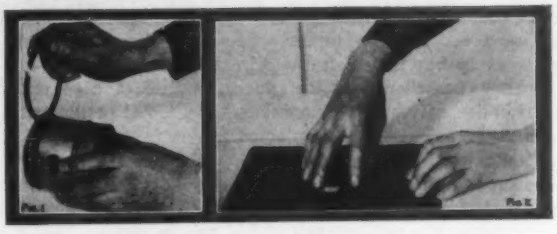


FIG. 1 FIG. 2

Contrary to the usual belief, the form of joint at the end of the ring does not have a great deal to do with the amount of compression loss. Of course, there are limits beyond which it is not wise to go with reference to clearance. However, it has been proved rather conclusively that rings may have a clearance of .015 or .020 in. at the ends, and in some cases as much as ⅛ in., without any noticeable loss of compression.

When fitting rings, there are two definite points to be kept in mind. One of these is the fit of the ring to the piston-ring groove; the other one, the fit of the ring to the cylinder wall. The amount of end clearance in the ring applies with reference to the latter fit.

Procedure

1. Lay the piston on the bench top, grasping it with the left hand as shown in Figure 1.

2. Take the piston ring in the right hand and roll it around in the groove, as indicated.

3. If the ring has just the proper clearance, it will be found that it rolls without sticking and yet without apparent play. If it refuses to roll and insists on climbing out of the ring groove, it is too tight. Test it in a number of positions to learn whether the entire circumference of the ring and groove is thus fitted.

4. It will be necessary to grind the ring if it will not fit into the groove. Place a piece of emery cloth on a faceplate.

Note: While the faceplate is preferred for this work, since it presents a perfectly true surface, it is not always possible to secure one. Under such circumstances a piece of plate glass is perhaps the best substitute. Use considerable care not to get hold of crystal glass, which is wavy and does not present a true surface. Plate glass is practically true. Another item which may be used for this work is a good, true bench top or a board free from wind or warp.

5. Place a sheet of No. ½ emery cloth on the glass or plate, grasp the ring by means of the thumbs and forefingers, as shown in Figure 2.

6. Grind the ring with a rotary motion.

7. Check the ring in the groove as the grinding proceeds. The amount of clearance specified is from .001 to .002 in.

Note: A ring fitted with .001 in. clearance is just free enough that it can be rolled with a slight sticking feeling, as it goes about the piston. .002 in. clearance will show practically no tendency to stick to the groove.

8. After one ring has been fitted it should be so placed that it can be immediately picked up for the groove to which it has been fitted.

9. Proceed to fit the rings to each groove, laying them away as suggested above.

10. Before installing these rings on the piston they must be fitted to the cylinder for which they are intended. This is the subject of another job sheet.

ELEMENTARY ELECTRICAL PROBLEMS

Edward B. Flaherty, Boston, Massachusetts

When short courses of electrical work are given to the boys of the sixth, seventh, and eighth grades, it is frequently quite difficult to keep the more progressive boys busy while the others are trying to catch up. Of course, drill problems or a small project may be resorted to, but this may not always be possible due to existing conditions.

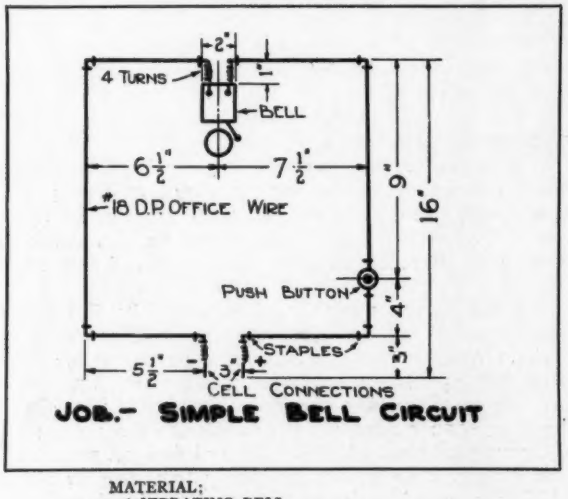
Boys in these grades find job sheets rather confusing and the instructor has to give them the necessary individual assistance for the completion of the job.

Important trade knowledge, technique, and related subjects are more easily taught to these pupils by class instruction, where every boy may participate in the lessons. As it is evident that the characteristics and capabilities of each pupil differ in dexterity and workmanship, a method of presentation to meet the average pupil is adopted.

This method is usually successful with mixed grades. The instructor sketches problems similar to those shown herewith, on the blackboard. The drawings need not be to scale. Beneath the problem, the required material is written down.

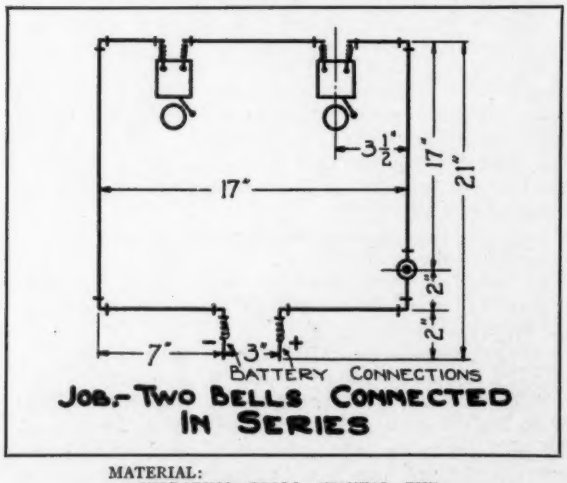
The pupil is then told to sketch the job from the given dimensions. He reports to the instructor as soon as he has done this, and then his sketch is checked. After he has obtained the teacher's O.K., he proceeds to lay down the job on a 2 by 3-ft. wiring board. It is to be observed here that in working from his sketch, the boy must do the same as the man on the job. This may make the boy experience some difficulty on his first jobs; hence, there is opportunity for the instructor to help the students by either individual, group, or class instruction.

All jobs are tested in the presence of the instructor, so that any mistake may be corrected at once.

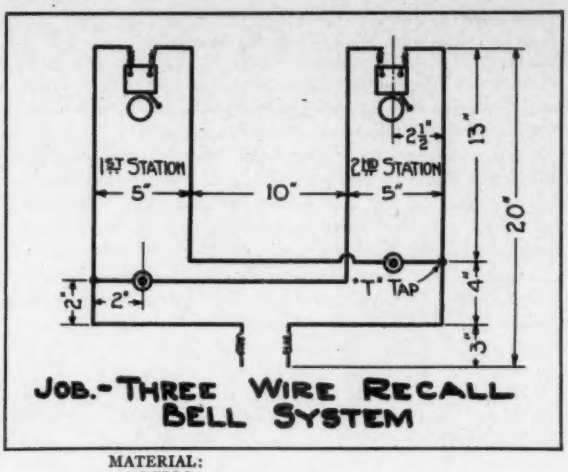


MATERIAL:
1 VIBRATING BELL
1 PUSH BUTTON
NO. 18 D.P. OFFICE BELL WIRE
STAPLES

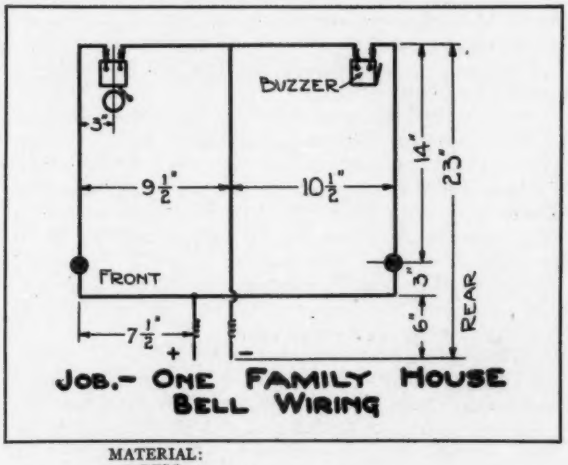
N. B. In these problems, no screws are tabulated in the lists of material, as in this matter the instructor uses his discretion in regards to the sizes.



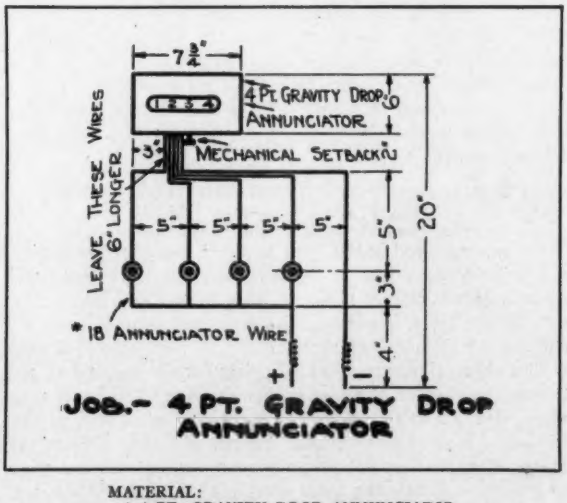
MATERIAL:
2 VIBRATING BELLS (HAVING THE SAME RESISTANCE)
1 PUSH BUTTON
NO. 18 D.P. OFFICE BELL WIRE
STAPLES



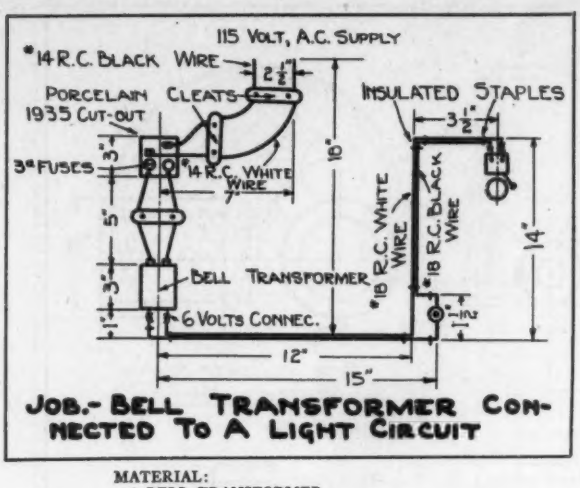
MATERIAL:
2 BELLS
2 PUSH BUTTONS
NO. 18 D.P. OFFICE BELL WIRE
STAPLES
FRICTION TAPE



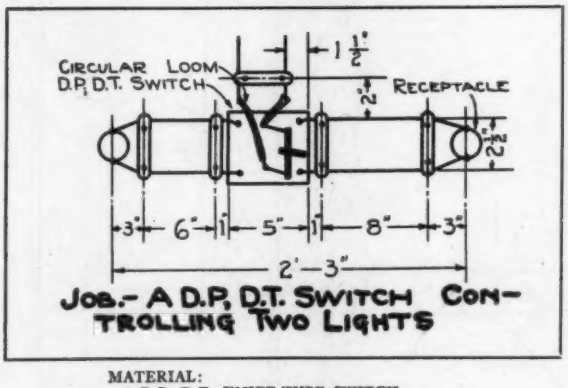
MATERIAL:
1 BELL
1 BUZZER
2 PUSH BUTTONS
NO. 18 D.P. OFFICE BELL WIRE
FRICTION TAPE



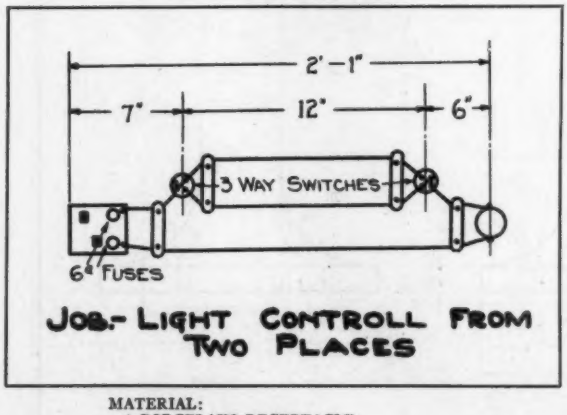
MATERIAL:
1 4-PT. GRAVITY DROP ANNUNCIATOR
4 PUSH BUTTONS
NO. 18 ANNUNCIATOR WIRE
STAPLES
FRICTION TAPE



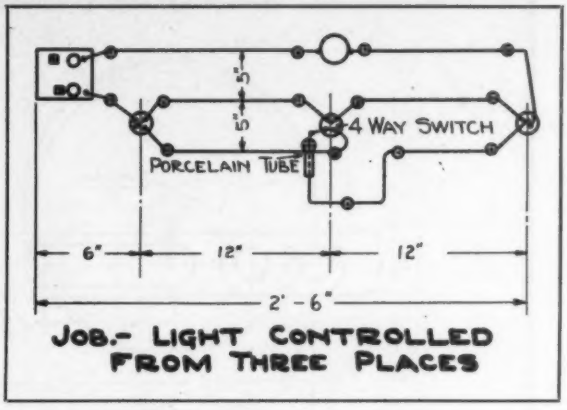
MATERIAL:
1 BELL TRANSFORMER
3 PAIRS OF CLEATS
1 1935 CUT-OUT
2 3-AMPERE FUSES
1 PUSH BUTTON
2 PORCELAIN KNOB CAPS
1 BELL
NO. 18 R.C. SOLID WIRE (WHITE)
NO. 18 R.C. SOLID WIRE (BLACK)
NO. 14 R.C. SOLID WIRE (WHITE)
NO. 14 R.C. SOLID WIRE (BLACK)



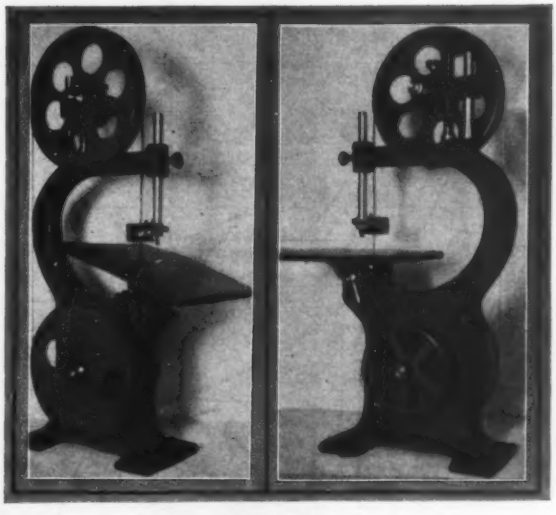
MATERIAL:
1 D.P. D.T. KNIFE-TYPE SWITCH
5 PAIRS OF CLEATS
2 PORCELAIN RECEPTACLES
CIRCULAR LOOM
NO. 14 R.C. SOLID WIRE (BLACK)
NO. 14 R.C. SOLID WIRE (WHITE)



MATERIAL:
1 PORCELAIN RECEPTACLE
1 1935 CUT-OUT
2 3-WAY SWITCHES
4 PAIRS OF CLEATS
2 6-AMPERE FUSES
NO. 14 R.C. SOLID WIRE (BLACK)
NO. 14 R.C. SOLID WIRE (WHITE)
2 SWITCH BASES



MATERIAL:
1 PORCELAIN RECEPTACLE
2 3-WAY SWITCHES
1 4-WAY SWITCH
14 SPLIT PORCELAIN KNOBS
1 PORCELAIN TUBE
1 1935 CUT-OUT
NO. 14 R.C. SOLID WIRE (BLACK)
NO. 14 R.C. SOLID WIRE (WHITE)
3 SWITCH BASES
2 6-AMPERE FUSES
FRICTION TAPE



BAND SAW

Dorcey E. Kellogg, Erie, Pennsylvania

The band saw shown in the accompanying illustrations was designed by the writer and built at East High School machine shop, Erie, Pa. This machine offers opportunities for correlation between the drafting room, pattern shop, and machine shop. It will therefore be very much worth while and interesting to trade-school students.

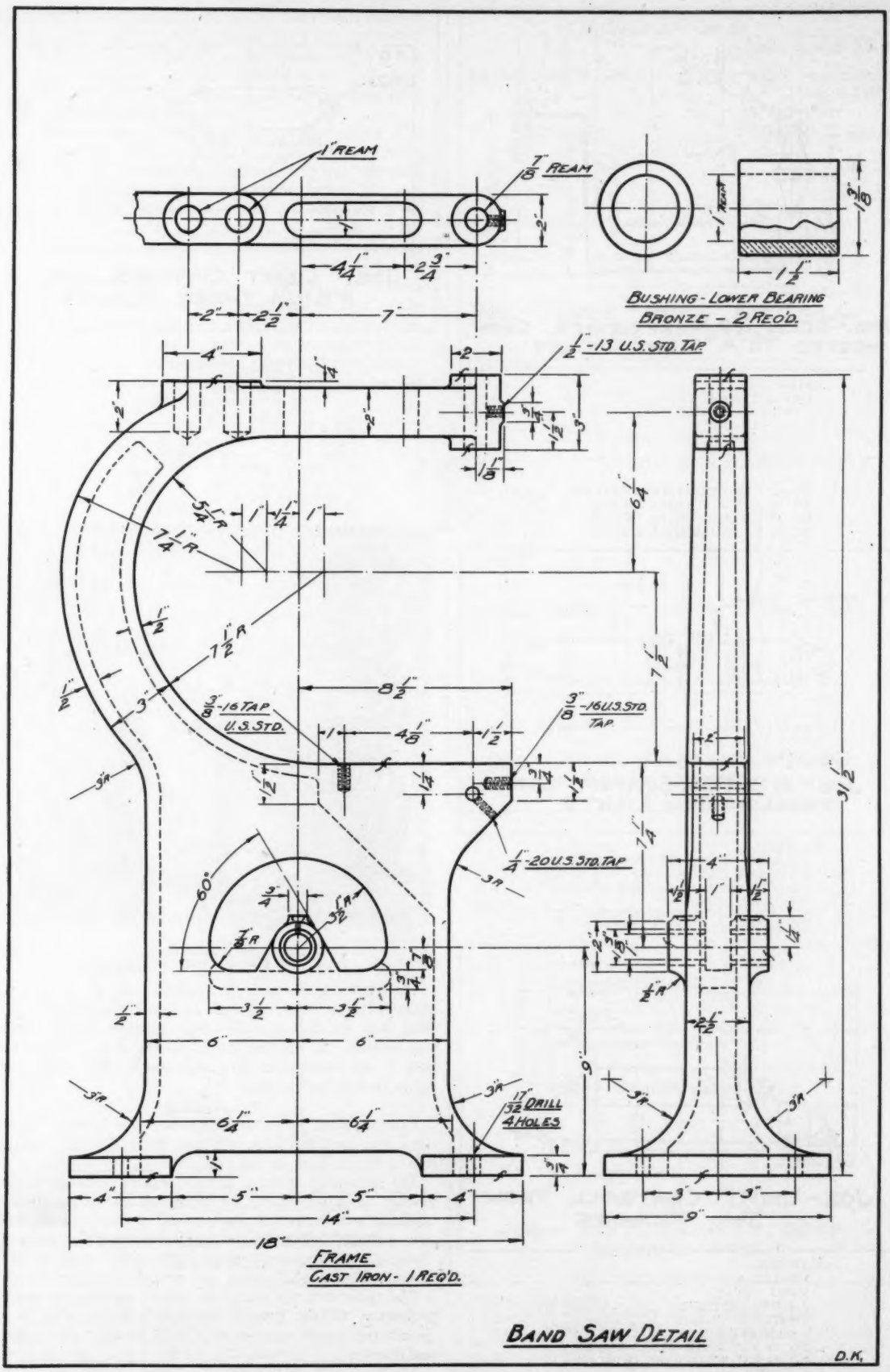
Patternmaking

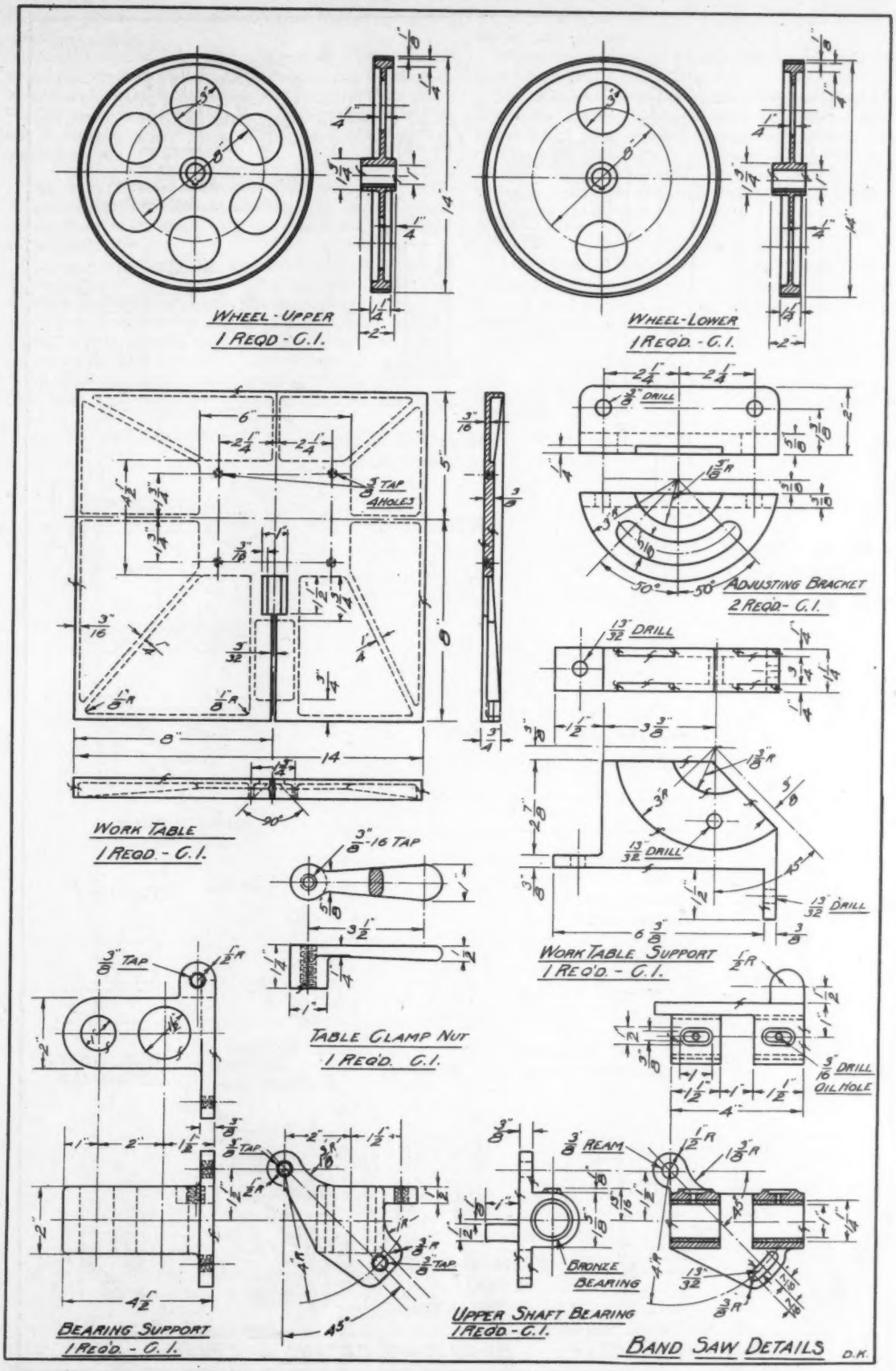
Patternmaking instructors will find a wide variety of operations, processes, machines, and tools covered in the construction of the patterns for the band saw.

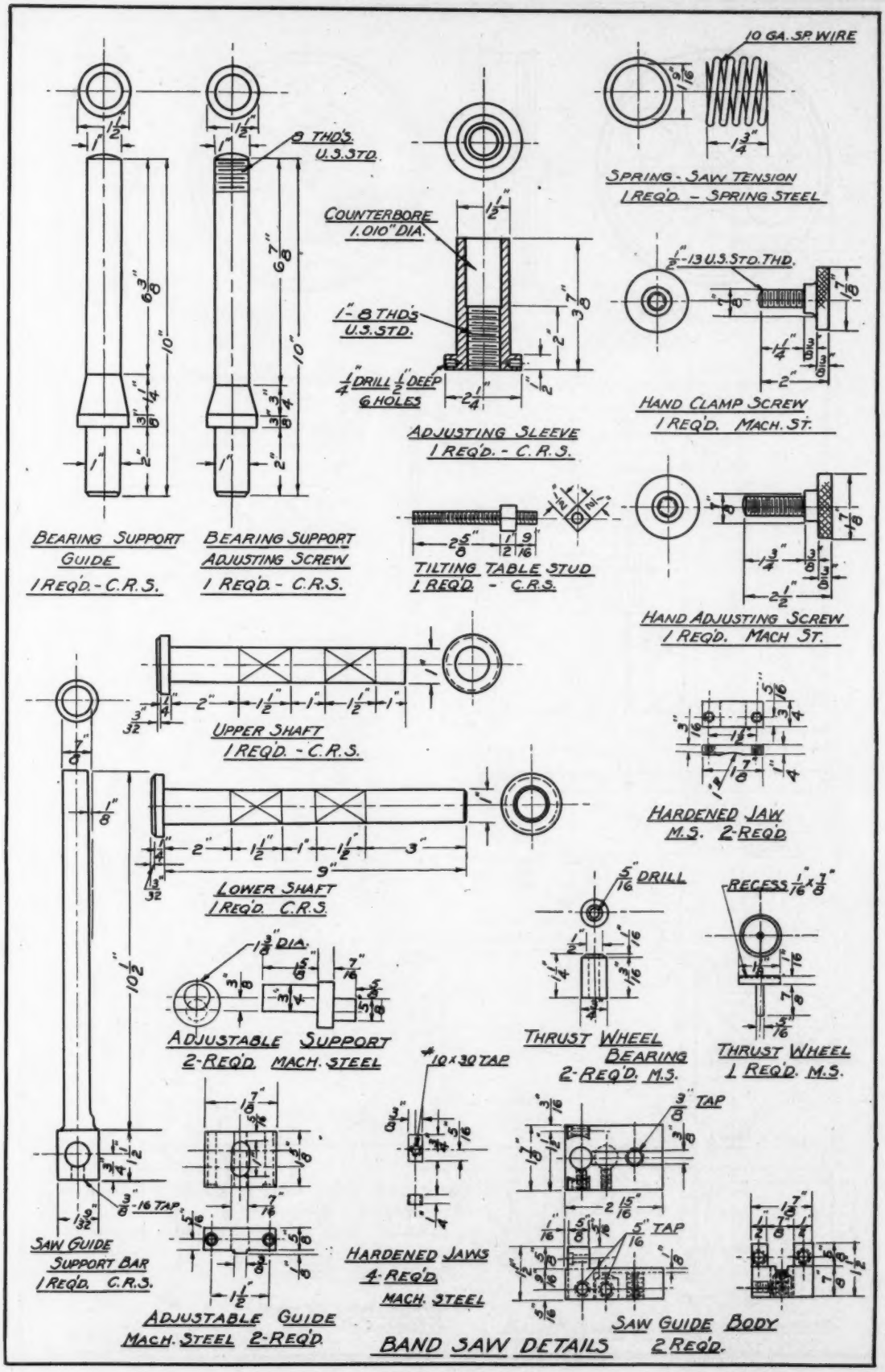
The operations covered involve making full-size layouts, getting out stock, boxing up, laging up, gluing up stock to minimize warping and shrinkage, band sawing, cleaning up to size, sanding (hand and machine) segmental work, turning (faceplate and between centers), rechucking, setting in webb, carving, filleting, shellacking, and stamping for identification.

The tools used are the plane, knife, combination square, protractor, chisels, gouges, shrinkage rule, marking gauge, spokeshave, corner rounders, fillet balls, turning tools, calipers, and dividers.

Machines used include the band saw, cut-off saw, jointer,


1" REAM
7/8" REAM
1" REAM
BUSHING - LOWER BEARING
BRONZE - 2 REQ'D.
1/2"-13 U.S. STD. TAP
3/8"-16 TAP U.S. STD.
3/8"-16 U.S. STD. TAP
1/4"-20 U.S. STD. TAP
17/32" DRILL 4 HOLES
FRAME
CAST IRON - 1 REQ'D.
BAND SAW DETAIL
D.K.


WHEEL - UPPER
1 REQD - C.I.
WHEEL - LOWER
1 REQD. - C.I.
WORK TABLE
1 REQD. - C.I.
ADJUSTING BRACKET
2 REQ'D - C.I.
WORK TABLE SUPPORT
1 REQ'D. - C.I.
TABLE CLAMP NUT
1 REQ'D. C.I.
BEARING SUPPORT
1 REQ'D. - C.I.
UPPER SHAFT BEARING
1 REQ'D - C.I.
BRONZE BEARING
BAND SAW DETAILS
D.K.


10 GA. SP. WIRE
SPRING - SAW TENSION
1 REQ'D. - SPRING STEEL
8 THD'S. U.S.STD.
COUNTERBORE 1.010" DIA.
1"-8 THD'S U.S.STD.
1/4" DRILL 1/2" DEEP 6 HOLES
ADJUSTING SLEEVE
1 REQ'D. - C.R.S.
1/2"-13 U.S.STD. THD.
HAND CLAMP SCREW
1 REQ'D. MACH. ST.
BEARING SUPPORT GUIDE
1 REQ'D. - C.R.S.
BEARING SUPPORT ADJUSTING SCREW
1 REQ'D. - C.R.S.
TILTING TABLE STUD
1 REQ'D. - C.R.S.
HAND ADJUSTING SCREW
1 REQ'D. MACH ST.
UPPER SHAFT
1 REQ'D. - C.R.S.
HARDENED JAW
M.S. 2-REQ'D.
LOWER SHAFT
1 REQ'D. C.R.S.
5/16" DRILL
RECESS 1/16" x 7/8"
1 3/8" DIA.
ADJUSTABLE SUPPORT
2-REQ'D. MACH. STEEL
THRUST WHEEL BEARING
2-REQ'D. M.S.
THRUST WHEEL
1 REQ'D. M.S.
10 x 30 TAP
3/8" TAP
3/8"-16 TAP
SAW GUIDE SUPPORT BAR
1 REQ'D. C.R.S.
HARDENED JAWS
4-REQ'D.
MACH. STEEL
5/16" TAP
ADJUSTABLE GUIDE
MACH. STEEL 2-REQ'D.
SAW GUIDE BODY
2 REQ'D.
BAND SAW DETAILS

thickness planer, rip and crosscut saws, sanders (disk and spindle), and lathe.

The related information and science covered are necessary in making provision on the pattern for centering an irregular-shaped job for turning the casting in the machine shop, simple molding operations, cut partings, loose drawback pieces, the use of chaplets, stop-off pieces, pasting cores, blacking, venting, and gating.

Machine-Shop Work

This project is of such a type and size that it can be machined successfully with the machine and tool equipment usually found in the school shop. No special tools or fixtures are required.

The machine is designed to give the student experience on the various machines found in the school shop, and also a variety of bench work. The processes involved, the fits required, and the machine set-ups are such as to arouse the boy's interest. Every operation must be carefully executed, yet all are well within the abilities of the average trade-school student.

The lathe operations covered include straight turning between centers, screw cutting, turning to shoulder, taper turning with the compound rest, chucking, drilling in the lathe, boring, and reaming.

Milling-machine operations are plain milling, face milling, and drilling in the miller.

The drill-press operations afford a fine variety of layouts, drilling and reaming; while the bench work also offers a variety of layout, filing, scraping, tapping, and assembly work.

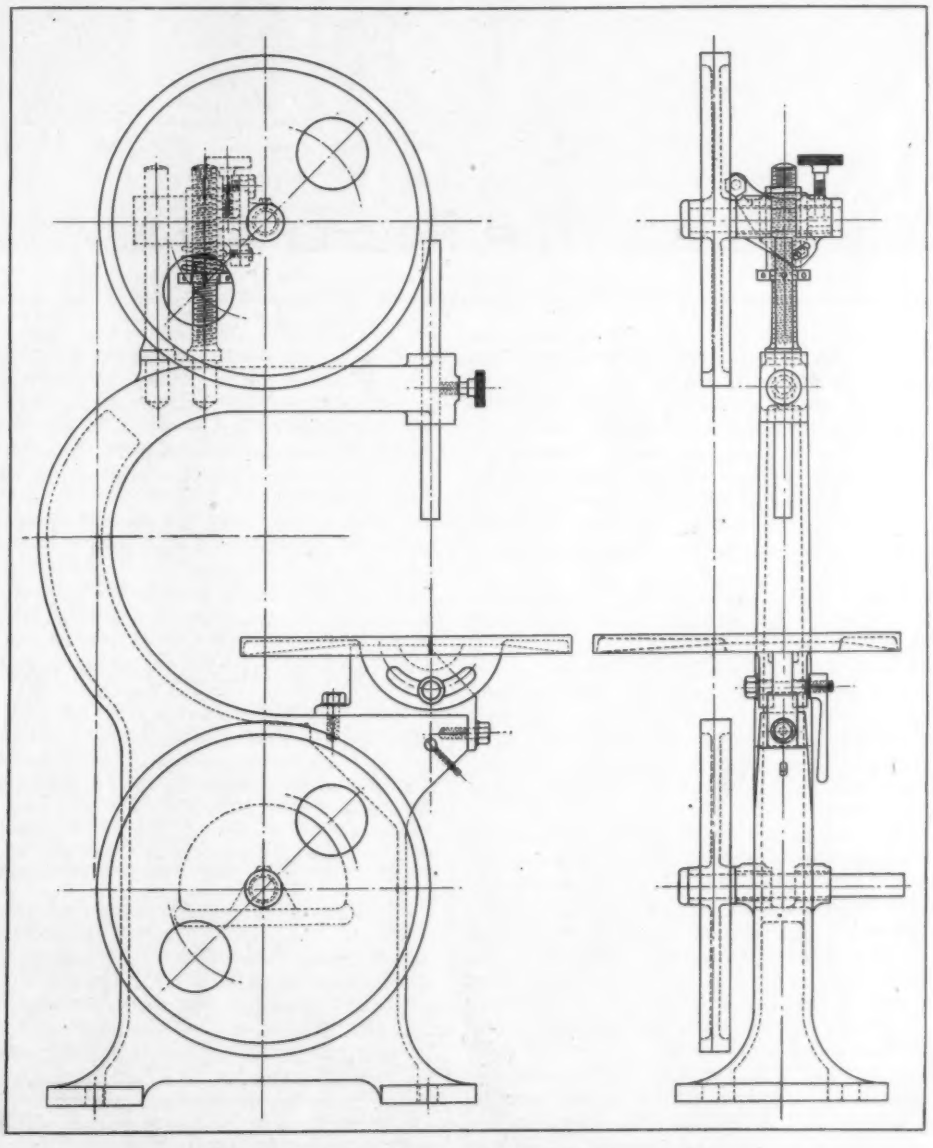
When constructed, this little machine will find a ready place in any school woodshop. The power pulley and guard, neither of which is shown in the detail drawings, must, however, not be forgotten in the final assembly.

POLYCHROME CLOCKS

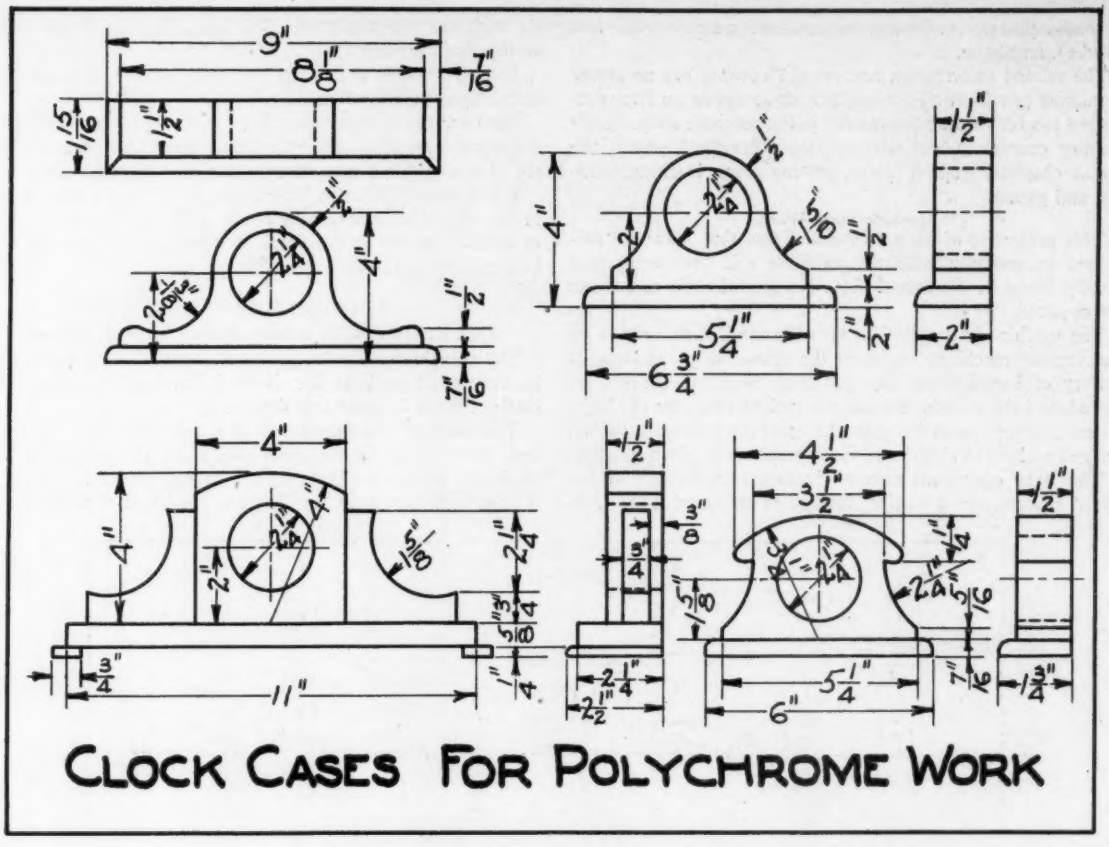
Fred E. Jeska, High School, McIntosh, South Dakota

The polychrome clocks presented herewith have proved to be very good projects for junior-high-school students. The cost per clock is about two dollars.

The clock frames may be made out of white pine or hemlock pieces found in the scrap pile. Draw the pattern of the clock you wish to make on a piece of stiff paper. This pattern is then used to convey the design to the block of wood. After



COMPLETED SAW WITHOUT GUARD AND POWER PULLEY



the frame has been cut out, give it a coat of shellac and allow it to dry. This acts as a surfacer for the clay or gesso and will make the latter stick much better.

The clay or gesso may be applied in a number of different ways, but only two methods will be described.

First Method. Take the brush and give the entire surface of the frame a thin coating of the clay, filling all cracks. Allow this coat to dry for a day. After it has thoroughly dried, give the entire surface a coat of shellac. After this has dried, take a small water-color brush and with it apply the clay to form a design.

Second Method. Another method is to give the frame a coat of shellac. After it is dry, take a round stiff brush which is about 1½ in. in diameter. Brush a ⅛ to 3/16-in. coat of clay or gesso over the entire surface of the frame. If the gesso is soft, let dry a few moments. Then take the round brush and prick into the gesso and remove with a slight jerk, thus leaving a rough pointlike surface. Do this over the entire surface, and then allow the whole to dry perfectly. After the surface has dried, the sharp points may be sanded down to suit the taste of the builder.

Next give the clock a coat of lacquer or Duco. Green, orange, and blue are good base colors. As soon as the surface has been covered with the lacquer, the bronzing powders may be applied. The powders may be put on by placing in a piece of cheesecloth or in a pepper shaker. It should be sprinkled lightly, so that the powders are uniformly distributed. Two or three different kinds of powders may be used on the same surface. The powder which does not stick to the surface may be removed by simply blowing it off. This tends also to help blend the colors. Silver, blue, and gold; red, blue, and gold, green, blue, red, and gold, make nice color combinations.

Another method is to apply a coat of varnish over the gesso, allowing it to dry a few moments. Then take the powders and apply as suggested in the foregoing. If you have a spray, it is well to spray the bronzes when dry with a very light coat of shellac. This tends to help blend the colors and also to protect the powders from rubbing and wearing off.

Pepper shakers are very handy in polychrome work. In order to show what particular bronzing color is contained in each, put a dab of varnish on one side of the shaker and sprinkle a bit of the color which it contains on this surface. Keep the shakers in a small box to make them more accessible when wanted.

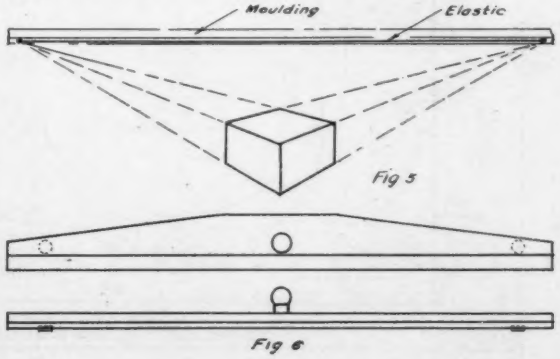
To finish up the clocks, fasten felt cloth on the bottom of the housing with glue. After this has dried, trim off the surplus cloth neatly.

Two and one quarter-inch clock movements are used in these clocks. They can be obtained at a cost of about eighteen dollars per dozen.

INSTRUCTIONAL AIDS USED IN MECHANICAL DRAFTING

Geo. Heald, Los Angeles, California

It is quite imperative in mechanical-drafting classes of 30 students or more, where individual instruction must be given, to employ all the possible aids that will help the students to help themselves.



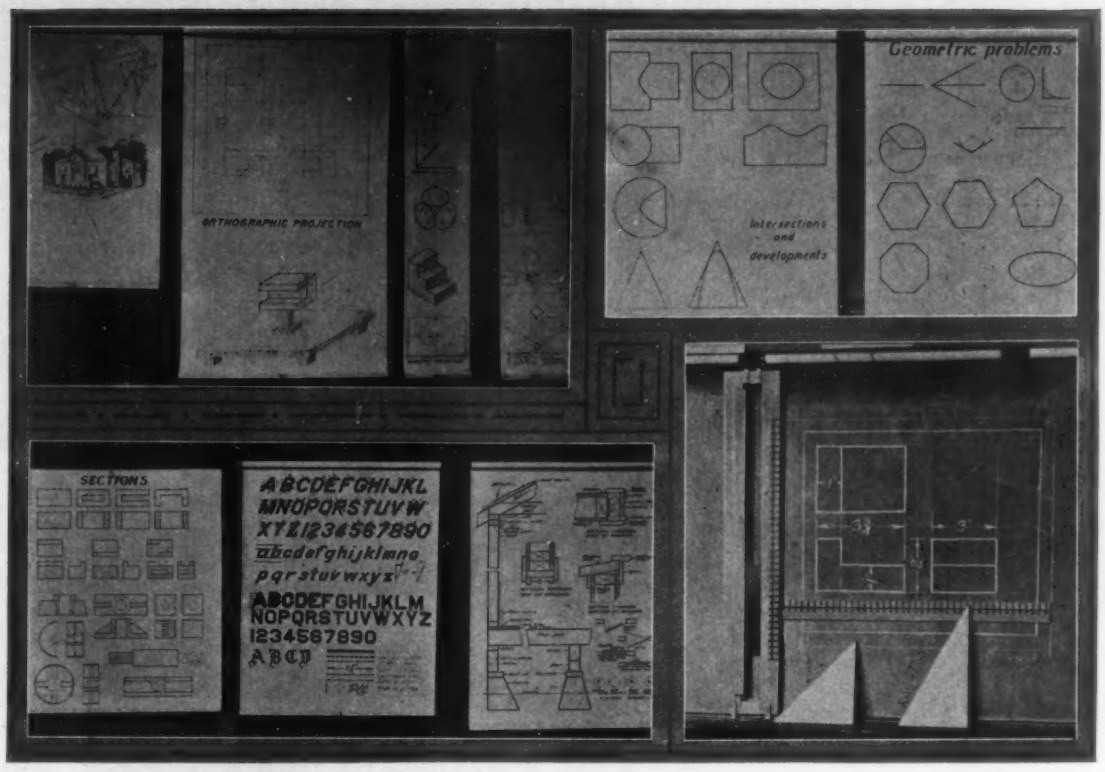


FIG. 1. Roller chart showing methods of making orthographic projections.
FIG. 2. Showing roller charts with intersections, their developments, and geometric problems.
FIG. 3. Roller chart showing various sections and draftsmen's alphabets.
FIG. 4. Useful blackboard T-square and triangle.

The roller charts illustrating various phases of drafting, as shown in Figures 1, 2, and 3, suggest a way in which illustrative material may be made accessible to the student. Ordinary window-shade rollers and white shade material were used in their making. All lines, letters, and figures are single stroke, made with a speed-ball pen.

Figure 4 shows a fixture with which the instructor can very efficiently demonstrate the use of T square and triangles, also the various types of drafting. The picture shows how simple the construction really is. The T square is held in any desired position by friction, and it is held sufficiently rigid to support the weight of the triangles.

Figure 5 shows a piece of round white elastic fastened to the molding at the top of the blackboard. This is a very helpful device for teaching perspective. By chalking the elastic and snapping it on the blackboard, it will be noted that all lines on the drawing may be obtained, vanishing to the points where the elastic is fastened.

Figure 6 illustrates a straightedge which will be found much more efficient than a yardstick for ruling lines on the board. Two rubber inserts are put into the base of the straightedge which throws the working edge close to the board and also prevents slipping.

UPHOLSTERY PROJECTS FOR BEGINNERS

Herbert Bast, Sheboygan, Wisconsin

It is difficult to find a suitable beginner's project in upholstering work, as the cost of the project when completed is apt to be more than the students want or can afford to pay.

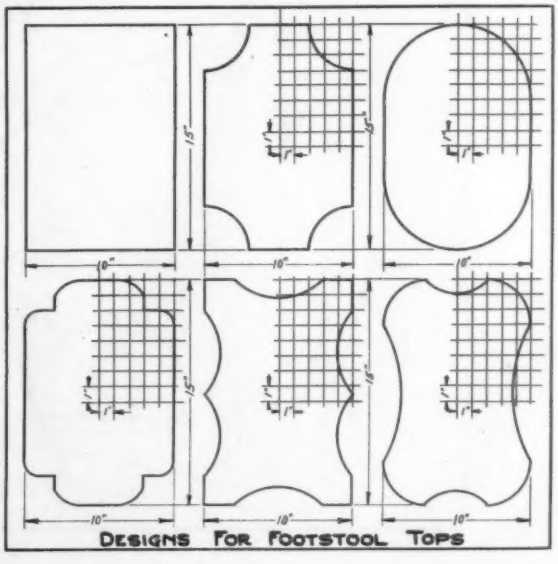
The projects illustrated herewith, overcame this difficulty, as the frame tops are just an ordinary ¾ by 10 by 15 in. board. The various shapes can be cut out with a bandsaw, but should this not be available a scroll saw will suffice.

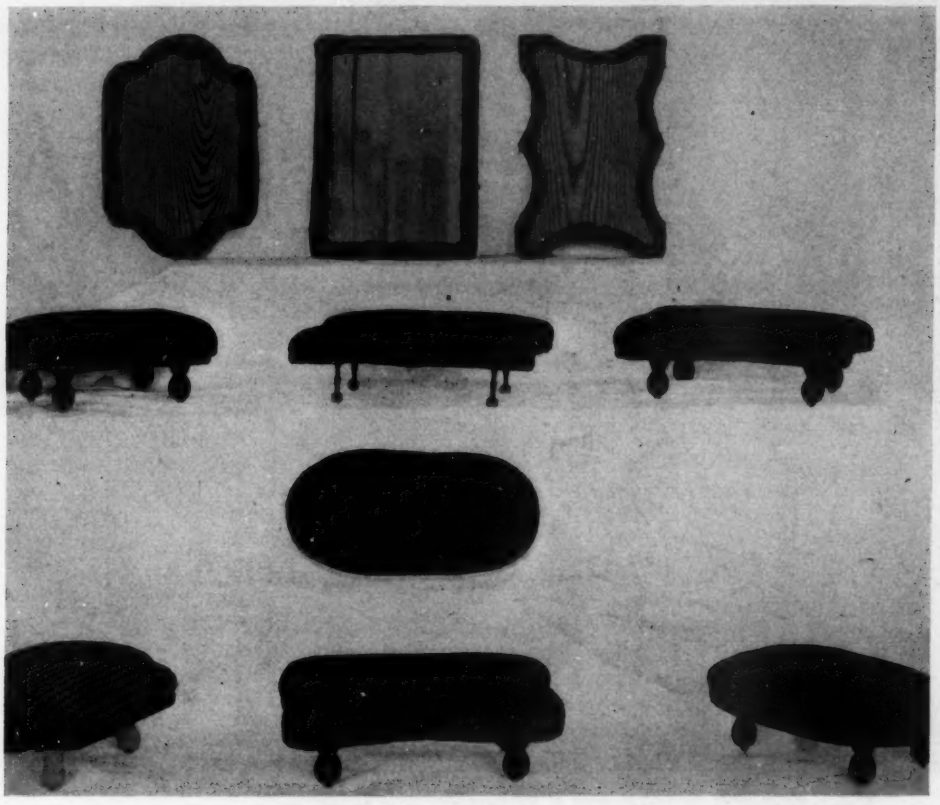
The legs are door stoppers which can be purchased at the hardware or department store. These legs can be put on after the project is completed, as the stoppers can readily be screwed to the bottom of the completed stool. If wood legs are turned up, however, they should be attached to the board top before upholstering. This can be done by means of screws put through from the inside of the board before the upholstering is done.

These footstools involve a number of processes in upholstering. When they are completed, they are useful and ornamental, but they also are quite inexpensive.

Procedure for Upholstering the Stool

1. Make a roll edge all around the top.
   a) Blind-tack a strip of burlap all around the frame.





SIMPLE FOOTSTOOLS DESIGNED BY HERBERT BAST, SHEBOYGAN, WISCONSIN

b) Fill burlap with stuffing and twist into the roll upward and tack on top. This will prevent the cutting of the cover by the sharp edges of the frame and at the same time make the stool somewhat higher.

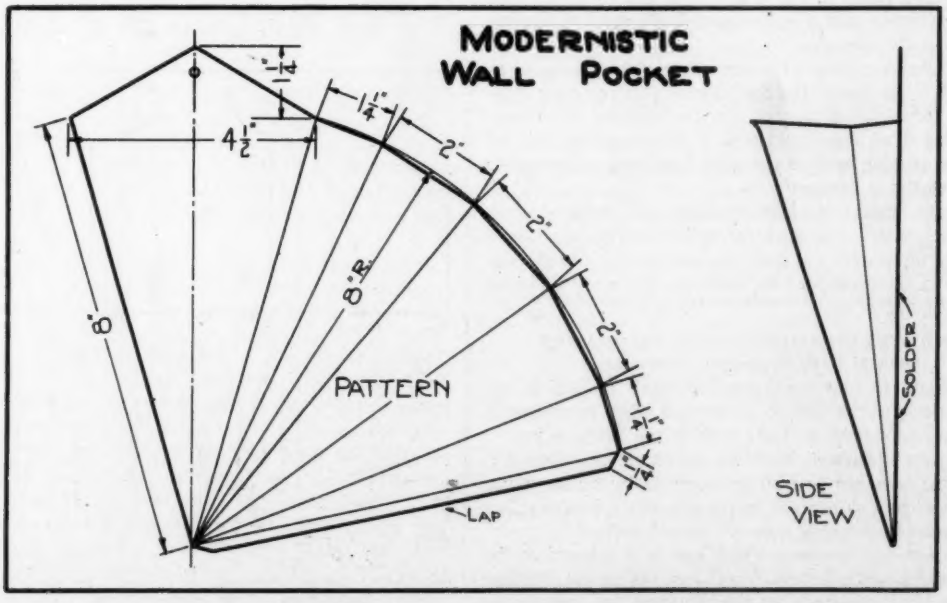
2. Upholster the top:

a) Place about one half the stuffing evenly over the top and tack it down. This will prevent the stuffing from moving about.

b) Place the balance of the stuffing evenly over the top, and stretch the cover tightly over it. The cover should be tacked near the bottom edge of the frame so the tacks will be covered with the gimp.

3. Gimping:

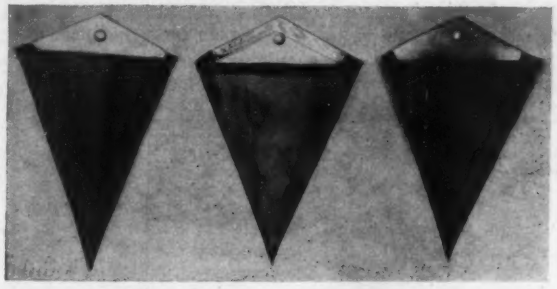
a) Tack gimp all around. The color of the gimp should match or be of a contrasting color to that of the cover. It should be put on with gimp tacks or metaline nails. Where contrasting colors are used, gilt upholstering nails are very attractive.



MODERNISTIC WALL POCKETS

Lee M. Klinefelter, Ruffner Junior High School, Norfolk, Virginia

Wall pockets are interesting and practical problems for the boy in the general or sheet-metal shop, and the ones shown here have a somewhat modernistic slant that does not detract from their attractiveness .



The material may be either copper, brass, or galvanized iron. If copper is used, 16- or 18-oz. weight will be about right, while No. 28 gauge galvanized iron works up very well. The bending is done on the cornice brake and should be carefully done. The lap is soldered down on the back, so no solder shows on the front or sides. After soldering, the upper edges should be flared out slightly over the edge of a block of wood.

The finish will, of course, depend on the material used. If of brass or copper, a bright polish, preserved with shellac or lacquer, is attractive, while the galvanized-iron pockets may be painted to suit the maker.

While the drawing shows only five sides, this is only suggestive. A larger number of sides probably make a more attractive vase, but also add to the difficulty of bending and forming.

BOOKCASE

J. E. Ray, Waukegan Township High School, Waukegan, Illinois

The bookcase shown herewith was made of black walnut, and has been very useful as well as practical. The kind of wood to be used, of course, depends largely on furniture with which the bookcase is to be placed.

The curves were drawn free-hand, and a template was then made of heavy detail paper, in order to keep them uniform. Round-head blued screws, accurately spaced, were used to fasten the parts together. The top curve has to be laid out carefully, as there is a tendency to get it too deep or too shallow.

The height was found to be just about right to serve instead of the customary mantel. Candlesticks, and a clock, help to give it a homelike appearance. The shelves are a little deeper than the usual bookcase, but this is very practical for large books and magazines.

When finished, give the wood a walnut stain, fill it, and give it a natural rubbed finish.

TOY MOTOR BOAT

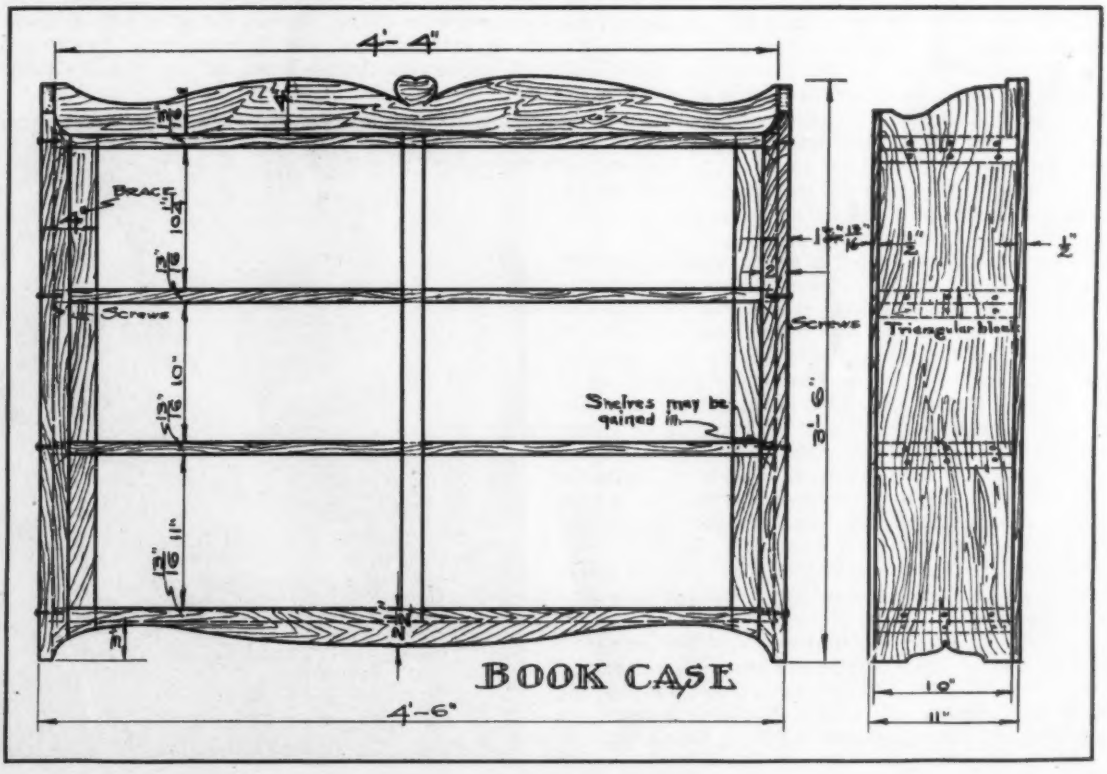
C. Anthony Van Kammen, Grand Rapids, Michigan

Modeling problems are always very desirable. Here is one for the seventh grader. Boats are ever a source of interest to boys, whether it be a roughly hewed block of wood, plus a world of imagination, or a beautifully modeled and painted toy yacht. Any wide-awake youngster will enjoy making this toy motor boat, either as a gift for the Christmas season or as a toy to be used during the summer-vacation period. Though it is not mechanical, having no motor, it is an excellent toy for the small youngster to float in the bath tub, down the swollen streams at the street curb after a heavy rain, or on the bathing beach where it may be pushed or towed by a string.

If time permits, a working drawing should be made including a stock bill. Even though a boy does not make a drawing, he should work out a stock bill from the instructor's blue print, as a check that he is able to read the drawing. Various-size models were made by the boys, but the standard boat was the one shown in the working drawing, Figure 1. The stock bill follows:

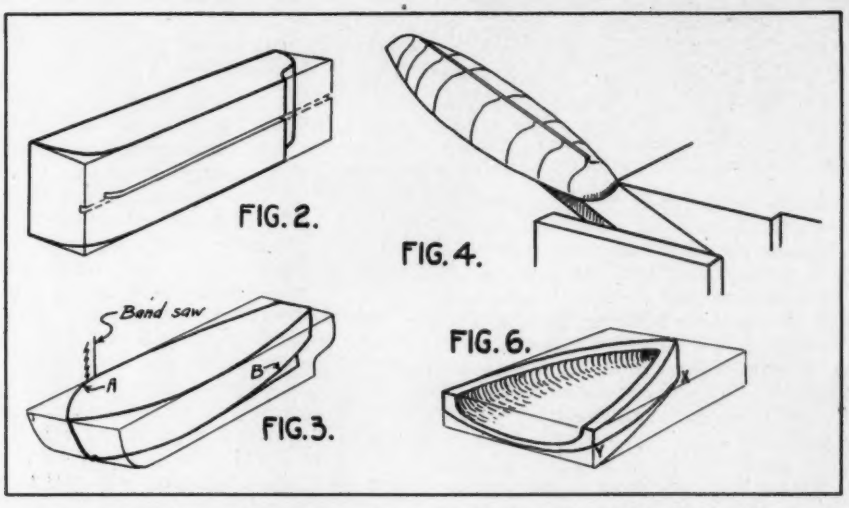
Stock Bill

1 pc.	1¾ x 4	x 18	Hull, white pine
1 pc.	⅝ x 4	x 5½	Forward Deck, white pine
1 pc.	⅛ x 4	x 12½	Rear Deck, white pine



1 pc.	1½ x 2 x 3⅜	Pilot House, white pine
1 pc.	1½ x 1½ x 3¼	Deck House, rear, white pine
1 pc.	⅜ x ¼ x 14¾	Keel, gumwood
1 pc.	3/32 x 4 x 8⅝	Canopy, gumwood

The outside of the hull is modeled first. The rough shaping is done at the machines. Square the stock to finish width and thickness. At the circular saw, cut a ⅛-in. grove ⅜ in. deep lengthwise of the piece, on the exact center for the keel. Trace the profile of the hull on the side of the stock, and cut the prow and stern. (See Fig. 2.) From a paper pattern of the top of the hull, trace the shape on the upper face of the stock. With the band-saw table tilted at an angle of 5 deg., saw to the line. The stock should be on the right side of the saw. (See Fig. 3.)

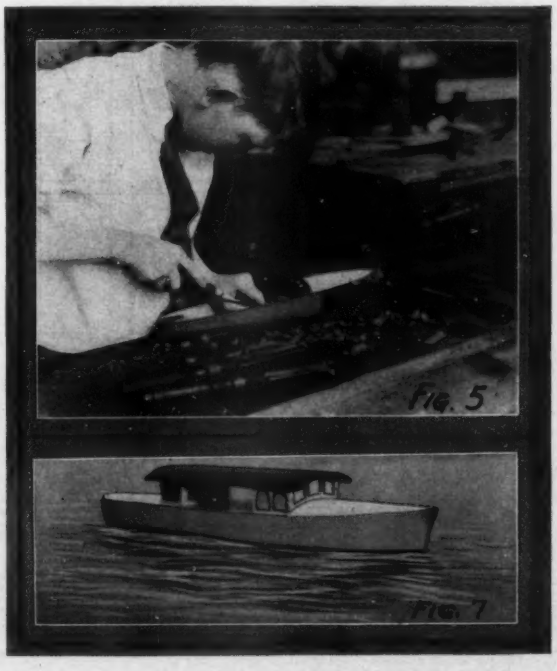


On each side of the stock, trace the contour of the bottom of the hull, profile view, without the keel at the stern end, as shown at B, Figure 3. Parallel with, and ⅜ in. above this bottom profile line, draw a second line from stem to stern. With the band-saw table set at an angle of 40 deg., saw to the upper line, keeping the stock on the right side of the saw. This operation roughly rounds out the bottom. The hull is now ready for the hand tools. Screw the stock to a board about 1 by 2½ by 20 in. Hold the projecting end of the board in a vise at whatever angle is best suited for the tool used, as shown in Figure 4. This method allows one to work on any part of the hull and observe how the two halves compare for shape. With spoke shaves and various-size gouges and chisels, shape the hull as desired.

As soon as all tool work is done on the outside of the hull, it may be filed and sandpapered smooth. Begin next on the inside. This must be hollowed out to make the boat light and buoyant. Much of the stock may be bored out with a No. 16 Forstner bit. Be very careful not to split the hull, which becomes more frail as it is gouged out. Figure 5 shows how to hold the hull. The adjustable hand screw, lying on top of the bench, and clamped very lightly to the hull, prevents it from spreading and splitting open, while the second hand screw, which holds the work to the bench, is tightened. Notice the solid piece left at the stern for the rudder post. See also the working drawing. Should this piece be gouged away the hull would leak and fill with water through the rudder-post hole, to be drilled in the bottom. When the inside of the hull is finished, give it a coat of white lead or paint and allow it to dry thoroughly.

From a paper pattern, lay out the forward deck on a piece of stock. The layout for the end may be seen in the sectional view on line BC, Figure 1. Study also the sectional view AB, the working drawing, and Figure 6. The inside is gouged out first, after which it is band-sawed to shape. Keep a full 1/16 in. outside the line. This is done so that there will be no difficulty in fitting the deck to the hull. The sides are dressed even with the hull after the deck is nailed in place. Turn the piece over and plane the top or deck rounding. Draw the slightly curved lines XY on the sides, which will help when planing. See Figure 6 and also the working drawing. Paint the hollowed underside and allow it to dry. Give the inside of the boat and the underside of the forward deck a second coat of white lead, this time also painting the edges which form the joint. With the proper-size brads, fasten the deck to the hull. Allow the paint to dry while working on the rear deck and deck houses.

Place the squared end of the piece of ⅛-in. thick deck stock tightly against the end of the forward deck, and trace the outline of the hull. Mark this face plainly "inside" so that the deck houses will not be fastened to the wrong face. Using the band saw, cut 1/16 in. outside the line. The simplest way of making the deck houses is to bore holes in two blocks of wood of the proper size and shape and fasten them in place as shown in the working drawing. Boring the holes lightens the blocks so that the boat will not be top-heavy. A compass saw will cut between the two holes; and the stock in the center



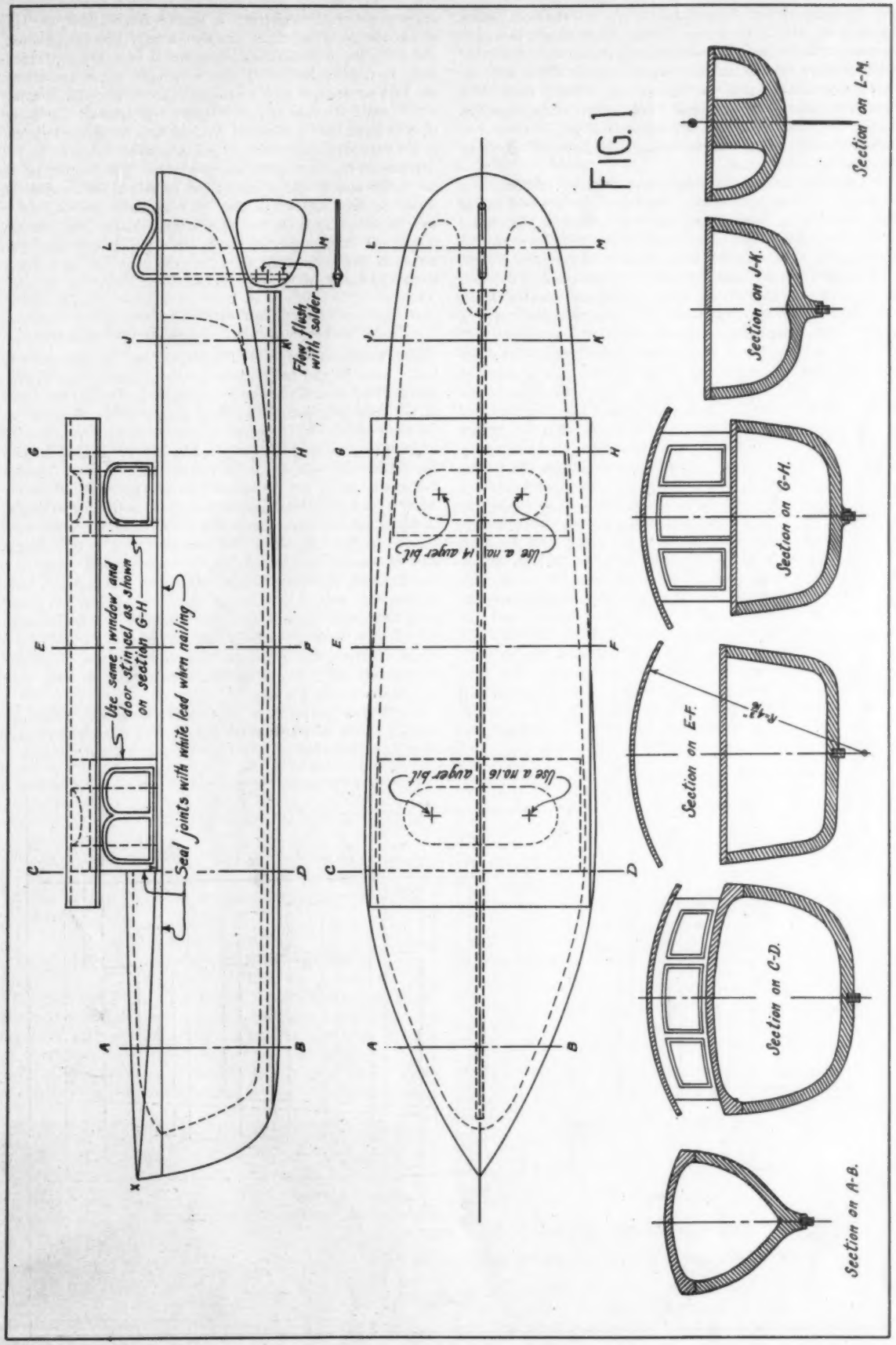

Use same window and door stiffeel as shown on section G-H
Seal joints with white lead when nailing
Flow flush with solder
Use a no.14 auger bit
Use a no.16 auger bit
Section on L-M.
Section on J-K.
Section on G-H.
Section on E-F.
Section on C-D.
Section on A-B.

FIG. 1

may be removed with a chisel. Locate and nail the deck houses to the deck. The forward one, or pilot house, should be exactly even with the forward end of the ⅛-in. deck stock so that when the deck is nailed in place, it will come tightly against the forward-deck stock and seal the opening. Brush a good thick coat of white lead or paint on all joints before nailing together. Fasten the deck to the hull with ½-in. or ⅝-in., 22-gauge box nails or brads. Be careful not to split the thin deck piece or the boat will *ship* water.

To drill the hole for the rudder post, locate it carefully and be sure to drill at right angles to the deck surface and in line with the keel. One-eighth inch drill rod is used for the rudder post. Use a drill a size or so smaller than ⅛ in., so that the rod will fit tightly in the hole. Copper or galvanized sheet iron, 24 gauge, is used for the rudder. Cut the piece to required shape, and with a ¼-in. wide cold chisel, cut slots as shown on the working drawing. With the slots crosswise, over a slightly open vise, drive every other section down about 1/16 in. Turn the metal over and do the same thing to the other sections. This will permit the ⅛-in. drill rod to be inserted in the rudder stock. With pliers or by hammering, pinch the metal tightly to the drill rod. Flow solder into the slots and file smooth. The rudder post is now forced into the rudder post hole. It is well to work white lead into this hole, with a small lettering brush or a toothpick, before shoving the rudder post in place. Bend the rod to shape with round-nose pliers.

The boat is now ready for the paint. The 3/32-in. thick roof or canopy stock is not nailed on until after the entire boat is painted and the windows and doors are painted on the deck houses. This is done by stenciling. Cut the stencils out of manila or typewriter paper. They must be made to fit each side of the deck houses. The pieces cut from the window openings are cut 1/16 in. smaller all the way around, and are marked for their corresponding openings. After the blue color for the glass is stenciled in and dry, the reduced cut-out window sections are centrally located on each corresponding window. Black or brown is then stenciled on to represent the window frames. Either paint or lacquer may be used for coloring the body and windows. The lacquers, if waterproof, of course, are better as they dry immediately. When the colors are dry the paper and paste is soaked and washed off. This makes the painting of the windows a very simple operation, and gets away from striping a fine line of even width to represent the window frames. While the window colors are drying, the roof or canopy may be painted. The under side is made white while the top is red or green. As soon as the paper stencils have been soaked off the top may be nailed in place. A few suggestions regarding the color scheme, follows:

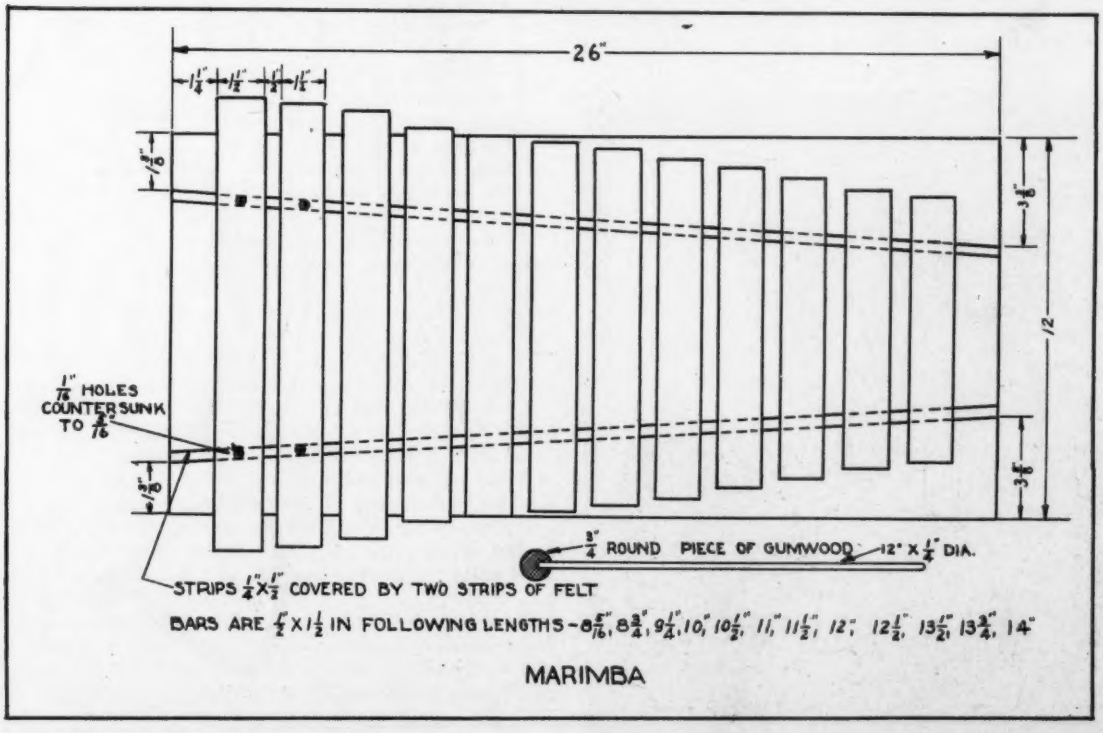
White is the most suitable body color. The bottom up to the water line is colored either red or green. Set the boat in water to find the water line. The windows are painted a greenish blue suitable for representing glass. The window frames are made brown or black, while the canopy is painted white on the under side and the same color as the bottom, below the water line, on the top side.

A MARIMBA

E. W. Walker, Senior High School, Dothan, Alabama

The marimba, shown in the illustration, is very easy to make, even by the second-year pupils in junior high school. The instrument is similar to the zylophone. The various tones of the marimba were obtained by cutting strips of poplar of the same width and thickness to lengths varying from 8 5/16 to 14 in. By cutting each succeeding bar off, beginning with the longest bar, one is able to get the tones desired. Though the lengths given for the bars in the drawing were accurately taken from a well-tuned instrument, these same lengths might, or might not, be correct in an exact duplicate. There are various factors that may change the tone of two pieces of the same kind of wood, even though they are precisely the same size. For instance, sap wood in the bar, wood that has not been sandpapered well, a knot in the bar, or a difference in grain, all of these will influence the tone. Therefore, it is advisable to cut all bars from the same plank, and each bar about ¼ in. longer than is given in the drawing, and then saw and plane off the ends until the tone desired is obtained. The tones may be tested with the piano.

The base of the marimba may be of any kind of wood. The two ¼ by ½-in. strips upon which the bars rest may also be of any kind of wood. Between these strips and the bars it


26"
1" HOLES COUNTERSUNK TO 1/16"
3/4" ROUND PIECE OF GUMWOOD 12" X 1/4" DIA.
STRIPS 1/4" X 1/2" COVERED BY TWO STRIPS OF FELT
BARS ARE 1/2" X 1 1/2" IN FOLLOWING LENGTHS - 8 5/16", 8 3/4", 9 1/4", 10", 10 1/2", 11", 11 1/2", 12", 12 1/2", 13 1/2", 13 3/4", 14"

MARIMBA

will be found best to put two strips of felt so as to insulate the bars from the strips. Before gluing strips to the base, the two nodal points of the longest and shortest bars must be found, so that the strips will be spaced properly on the base when the bars are placed on them. The two nodal points on the bar are those two points where the least vibration takes place when the bar is struck; or in other words, if the bar is supported at those two places where the vibration is the least, the greatest amount of volume will be obtained when the bar is struck. These points are easily found by getting someone to hold the bar on his two index fingers near the points shown in the drawing, then striking the bar with a stick. Move the fingers about under the bar until those two places are found so that the volume of the tone is the greatest. After the nodal points of the longest and shortest bars have been found and marked, adjust the strips of wood upon which these bars are to rest, on the baseboard. Do not nail them to the base, but glue them. The first piece of felt that covers these strips may be glued also, but the second piece of felt must not have any glue on it.

Each bar is held in place by two ¾-in. brads. These brads are driven into the strips through the two strips of felt. Care must be taken to see that the bars are not bound by these brads. To avoid binding, drill two 3/16-in. holes in the center of each bar at the nodal points and slightly countersink each hole on both sides of the opening.

A good varnish finish on the base of the marimba should make the project look well. One coat of shellac on the bars rubbed down well does not interfere with the tone.

The two sticks with which to strike the bars should be about ¼ in. in diameter and 12 in. long, with a ¾-in. round knob at one end.

Another type of marimba may be made by hanging the bars at the nodal points with a cord. The cord is fastened to the back of the bars with tacks. This marimba may be hung on a wall and played in a similar manner as the instrument shown in the drawing.

The instrument with the twelve bars as here represented has only full notes. Another layer of half-tone bars may be placed to the rear and slightly above the twelve original bars. Other things being equal, the length of the half-tone bars with the same thickness and width, would be as long as the shorter bar plus ½ the difference in the length of the next bar. For example, if one full-tone note bar was 10 in. and the next 10½ in., then the half-tone bar should be 10¼ in.

The marimba will be found an easy and interesting project to make in the shop; one that is inexpensive, and one that will add wholesome pleasure and enjoyment to the boy's leisure hours.

THE METAL CLOCK

E. LeRoy Longley, Forest Park High School, Baltimore, Maryland

Many an old parlor, dining-room, or kitchen mantle clock goes to the cellar or the scrap heap, because it is no longer up-to-date. That is what happened to the one mentioned in this article. It was, however, resurrected and reconstructed.

The clock, which was of the old wooden type, with a glass door that showed the "wheels going 'round" and the pendulum "knocking off its ticks," was taken out of its old housing, and given a new one made entirely of No. 18 copper. The design was layed off on tag board, cut out and transferred to the copper. The face design and figures were laid out and painted in with black Sapolin. The whole was then etched, leaving the figures and the design raised. The face was then made oval with a raising hammer on a block, the latter having been hollowed on the lathe for the purpose. The lower part was given a hammered finish.

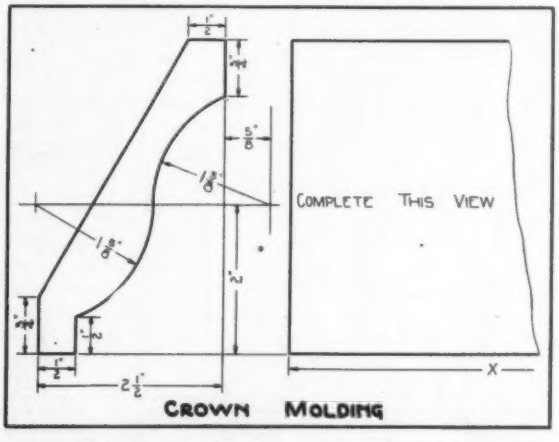
The works and gong were then fastened in place and the clock assembled by soldering.

The face and the base were polished with steel wool and lacquered. The remaining part of the clock housing was made antique by using liver of sulphur, after which it was wooled lightly and then lacquered. The hands and figures were painted with sea-green Duco to give the appearance of oxidized copper. Rubber-head tacks, soldered in the corners of the base, prevented the metal from scratching the mantelshelf upon which the clock was placed.

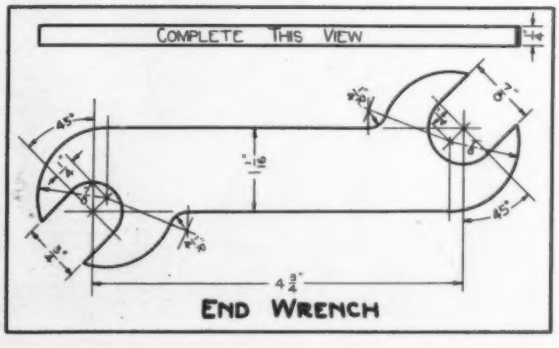
TEACHING THE DRAWING OF TANGENTS

C. A. Rosell, Arsenal Technical Schools, Indianapolis, Indiana

At times it is difficult to secure problems that bring out the construction of tangents, for the beginners in drawing. This is particularly true with regard to cases where circles, or arcs of circles, are tangent to each other. Such problems often become too difficult and too involved, due to the complicated mechanisms of which they are a part, and which usually are of objects with which the student is not familiar. It is important, however, to keep the problems so simple that the beginner can give his attention to the new features, that is, to the constructing of circles tangent to one another.



The problems here submitted are simple, and at the same time are familiar objects to every boy. Thus the beginner can concentrate on the new features which the problems are primarily trying to make clear. The construction lines have been



left as part of the drawing so that the pupil can see that circles become tangent on a line joining their centers, and straight lines become tangent to circles at the point where a line, drawn through the center of the circle perpendicular to the straight line, intersects the straight line.

WEATHER VANES AND OTHER SILHOUETTE PROJECTS

A. M. Youngquist, Waite High School, Toledo, Ohio

Making weather vanes and other silhouette projects has been an interesting addition to the regular industrial-arts program at the Morrison R. Waite High School, Toledo, Ohio. Their development has been a coöperative project — the designs were made in the art classes, the detail construction plans in the mechanical-drawing classes, and the vanes themselves were constructed in the machine shop. Figure 1 shows some of the designs that were produced. The Viking ship vane was designed for a new home whose owner is of Scandinavian ancestry and who is proud of the Viking traditions. The scarecrow design was made for a man by the name of Crowe. Any activity dear to the heart of a home owner may be expressed in a weather vane. For the golfer, the weather vane may show the drive-off from the tee, for the yachtsman, a yacht in action, for anyone interested in aviation, a plane or a Zeppelin. Designs may depict spring, domesticity, agriculture, hunting scenes, animals, witches, Dutch girls, and even the ridiculous or comic may be used.

The weather vane may be made of 18-gauge sheet steel, counterweighted with lead so as to balance perfectly, or it may be made of ⅛-in. aluminum sheet. The latter is easier to cut out, will not rust, and is so light that counterweighting is usually unnecessary. The cost of aluminum is greater, however.

The upright or shaft on which the vane is mounted is a ½-in. brass tube which revolves smoothly in the standard which is made of ¾-in. tubing. The revolving shaft rests on a ball-bearing support as shown in Figure 2. The crossarms are made of brass tubing, and the letters of brass plate.

To cut out the vanes, a drill press, hack saw, metal coping saws, and files are needed.

Other silhouette projects have been made to serve as foot scrapers, chimney irons, and for fireplace screens.

Designing silhouettes offers an interesting departure in the art classes, and the construction of weather vanes and other metal silhouette projects in the shop has a decided appeal to students. These projects offer a splendid opportunity for expressing individuality and originality in design and the finished products add interest and charm to any structure on which they may be mounted.

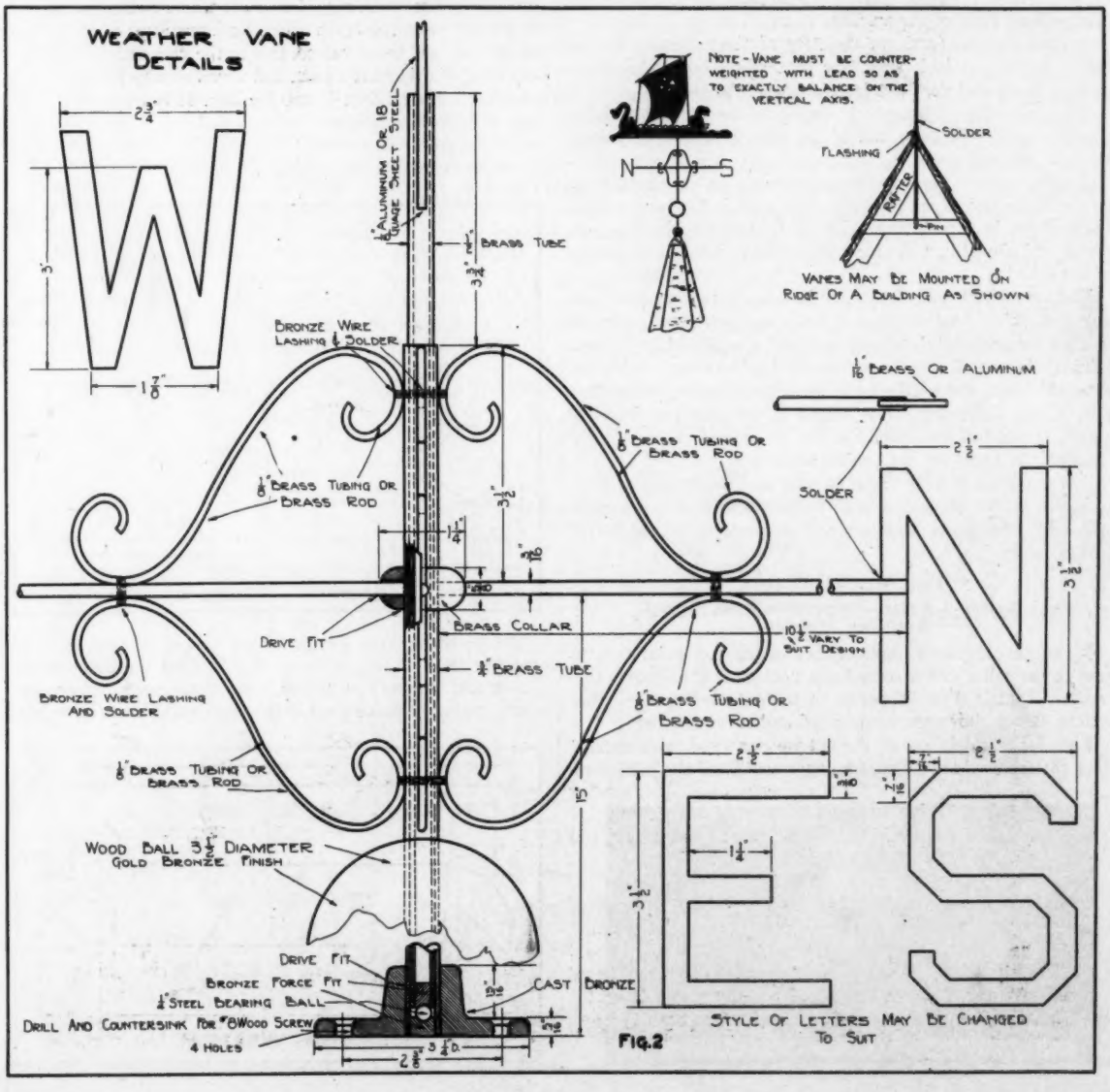

WEATHER VANE DETAILS
NOTE - VANE MUST BE COUNTER-WEIGHTED WITH LEAD SO AS TO EXACTLY BALANCE ON THE VERTICAL AXIS.
N
S
SOLDER
FLASHING
RAFTER
PIN
VANES MAY BE MOUNTED ON RIDGE OF A BUILDING AS SHOWN
1" ALUMINUM OR 18 GAUGE SHEET STEEL
BRASS TUBE
BRONZE WIRE LASHING & SOLDER
⅛" BRASS OR ALUMINUM
⅛" BRASS TUBING OR BRASS ROD
SOLDER
BRASS COLLAR
DRIVE FIT
10½" VARY TO SUIT DESIGN
¾" BRASS TUBE
BRONZE WIRE LASHING AND SOLDER
WOOD BALL 3½" DIAMETER GOLD BRONZE FINISH
DRIVE FIT
BRONZE FORCE FIT
¼" STEEL BEARING BALL
DRILL AND COUNTERSINK FOR #8 WOOD SCREW
4 HOLES
CAST BRONZE
STYLE OF LETTERS MAY BE CHANGED TO SUIT

FIG. 2

DR. PURDOM BECOMES DIRECTOR

Dr. T. Luther Purdom, who was recently appointed as director of the University Bureau of Appointments and Occupational Information of the University of Michigan, is a graduate of that university. He served for some years as a member of the staff of the school of education and as a member of the summer-school faculty. During the past four years he has served as director of the personnel work and as professor of education at the University of Missouri.

DR. T. LUTHER PURDOM
Director University Bureau of Appointments
University of Michigan,
Ann Arbor, Michigan

The new department, of which Dr. Purdom has charge, has been created to bring together the bureau on vocational counsel and placement, and the bureau having charge of the appointment of teachers.

MR. SCHWEICKHARD GOES TO MINNEAPOLIS

Mr. D. M. Schweickhard, who has been appointed director of vocational education at Minneapolis, Minn., is a native of Minnesota. He received his common-school education in the Mankato schools and later completed a course in the State Teachers' College. He completed a course in the college of engineering of the University of Minnesota in 1914–15. Later he went to the University of Wisconsin, where he was graduated with the degree of bachelor of arts. In 1927, he received the degree of master of arts from the University of Minnesota.

Mr. Schweickhard's teaching career has been varied in character, including work as a teacher, principal, assistant professor, director of industrial-arts and trade education, and summer-school instructor. He was assistant professor of trade and industrial education at Purdue University, Lafayette, Ind., from 1919 to 1920, and was director of industrial-arts and vocational education from 1920 to 1922. For the past eight years he has been state supervisor of trade and industrial education in Minnesota. During the summer of 1928, Mr. Schweickhard conducted special courses in industrial arts for teachers at the State Teachers' College, St. Cloud, and during the last summer session of 1929, conducted similar courses at the State Teachers' College, Bemidji.

DEAN M. SCHWEICKHARD
Director of Vocational Education
Minneapolis, Minnesota

THOMPSON APPOINTED STATE SUPERVISOR

Mr. Thompson, who was recently appointed as state supervisor of vocational education for Illinois, was formerly connected with the Washburne Trade School, of Chicago. Before going to the Washburne School, he was associated with a number of schools in the state.

Mr. Thompson, following graduation from the high school at Fairfield, Ill., attended Hayward College and the Northern Illinois Teachers' College at DeKalb. He also completed a course at Lewis Institute in Chicago. His teaching experience was gained in the rural schools of Illinois, and included work

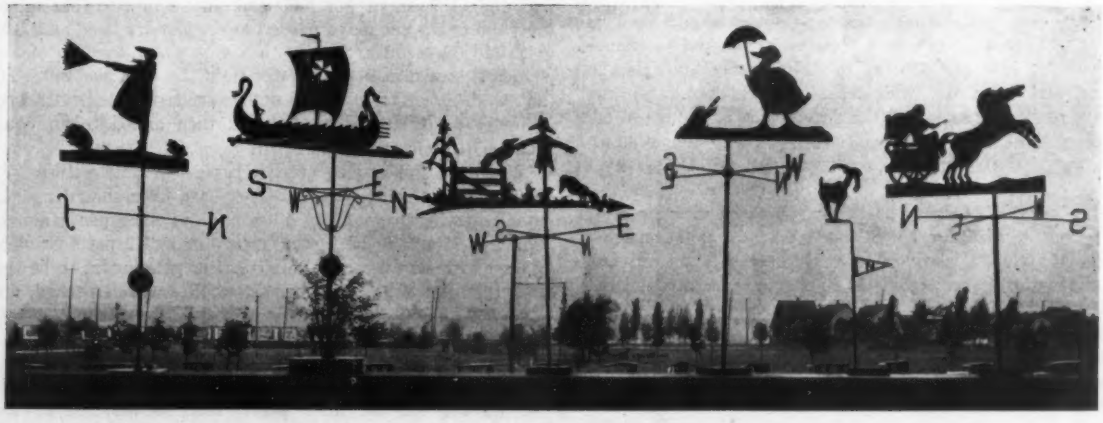


FIG. 1

as a teacher, high-school instructor, and principal. For six years he was a teacher of manual training in the Chicago schools, and then for ten years an instructor in the Washburne Continuation School. For the last five years he had

MR. J. W. THOMPSON
State Supervisor of Vocational Education
Springfield, Illinois

been a teacher of carpenter apprentices' classes. He has had wide experience in the building trades and has an intimate knowledge of the requirements for teaching classes in this line.

MR. FRANK M. LEAVITT, associate superintendent of schools of Pittsburgh, Pa., has been named as a member of the advisory committee which is to conduct a study of secondary education in the United States. The study is being conducted under the direction of Mr. William J. Cooper, Commissioner of Education. An appropriation of $250,000 was made by Congress for the work.

MR. J. A. EVANS, formerly assistant chief of the office of coöperative extension work for the U. S. Department of Agriculture in the southern states, has been appointed as director of the office. MR. T. WEED HARVEY has been made assistant chief of the office, and MR. M. M. THAYER, business manager. MR. F. A. MERRILL, formerly on the agricultural staff, has been assigned to the visual-education department, to have supervisory charge of the organization and maintenance of the publications program of the coöperative extension work.

MR. LLOYD B. STAYER has recently been appointed supervisor of continuation-school education in the Pennsylvania Department of Vocational Education. Mr. Stayer was formerly principal of the Lancaster Continuation School. He was also in charge of the cafeterias in the public schools. Mr. Stayer is a graduate of the Millersville State Normal School and has had a wide teaching experience.

MR. JOHN F. FRIESE, of the department of industrial education at the University of Wisconsin, has been appointed as a member of the summer school faculty of the University of Minnesota for the first term of the 1930 session.

MR. JOHN W. CURTIS has been appointed director of the placement service for handicapped persons at Minneapolis, Minn. Mr. Curtis, who was formerly on the faculty of Dunwoody Institute, received his M.A. degree in December last.

MR. C. D. THOMPSON and MR. JOHN WATSON have been reelected to the vocational school board of Appleton, Wis., for two-year terms.

MR. L. W. JONES, of Raleigh, N. C., has become a member of the manual-training staff of the high school at Pine Bluff, Ark. Mr. Jones succeeds C. N. Newcomb, who resigned from the position.

MR. A. P. FUNK and MR. J. J. VERCHOTA have been elected as new members of the board of vocational education at La Crosse, Wis. A memorial resolution was recently adopted by the vocational board in honor of Mr. Joseph B. Funke, who passed away on January 3. Mr. Funke was a pioneer in the vocational-school movement, and his interest, advice, and coöperation have made possible the remarkable progress of the vocational work in La Crosse.

NOW, ARE THERE ANY QUESTIONS?

Refinishing Gasoline Stoves

903. Q.: Kindly tell me how I may refinish a gasoline cook stove. Originally it was done in black enamel, baked I suppose. Last year this was sanded and several coats of brushing lacquer applied with the spray gun. Color was changed to two tones of green, rather light, and striped in orange. It was a nifty-looking job. However, when the oven on this stove was lit, the light-green lacquer changed to a dirty color from the heat.

Now the stove should be refinished again, but I do not know what materials to use. I would like to use green. I have no way of baking enamel. The lacquer sticks fine and does not peel, but discolors.

If I cannot use colors without discoloration, do you think that black lacquer would do the trick without discoloration?—*G. W. S.*

A.: There is no material available which you can use to give color coats on your gasoline stove. Lacquer, four-hour oil, and varnish enamels all have oil or gum bases that will not stand heat such as is given off by your oven without discoloring.

If black is not objectionable, then a high-grade turpentine baking japan will be as durable as can be expected. The fact that all stove manufacturers use vitreous enamels entirely, will indicate to you the limits of your problem. Black lacquer will probably discolor as bad as any other color, since it, too, has a high gum content.—*Ralph G. Waring.*

Finishing Indoako Wood

904. Q.: What method should I pursue for finishing Indoako wood or Philippine mahogany in order to give it a rich brown color?—*C. M. H.*

A.: Philippine mahogany lends itself to all the finishes usually applied to true mahoganies. It does, however, require sponging and sanding to eliminate the heavy whisker which is sure to develop from a water stain. Size the wood with a solution of 2 oz. of hot hide glue added to 10 to 12 qt. of hot water. Do not make any stronger. Let dry hard and sand with old 00 or finer. Stain with a 4-oz. color solution of any standard brown mahogany water stain. Let dry overnight. Do not sand. Size with a coat of orange shellac diluted with three volumes of denatured alcohol and then added to an equal volume of shellac-mixing lacquer.

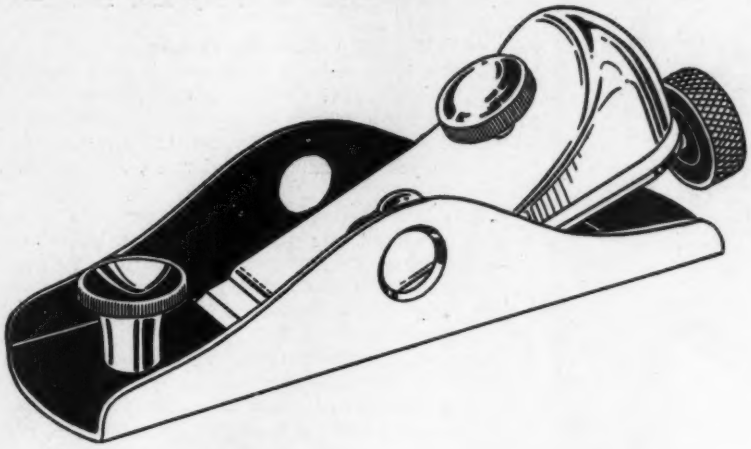
When the shellac-lacquer coat has dried, sand with a split 6/0 garnet finishing paper. A silex base filler should now be used, carrying from 14 to 16 pounds of filler per gallon of thinner which may be 1 part turpentine and 2 parts gasoline. Wipe all excess filler off carefully, after padding-in, to be certain that the large pores in this wood are well packed, and leveled off. Let the filler dry overnight, although 24 to 48 hours in a warm room will be better.

Size the dried filler with the same shellac-mixing lacquer material used to hold down the stain. When dry give a light sanding with the old paper used to sand the first shellac coat. Dust off and give a good coat of any standard four-hour var-

(Continued on Page 26a)

Instructors of Woodworking

New Steel Block Plane *for* School Use



AS AN ANSWER to the demands for a simple, unbreakable block plane for the school shop, we now offer this new all-steel plane.

With a minimum of parts, this plane is practically "Boy-Proof." The 1⅝" cutter is held at a low angle. The lever cap is made of steel and is fitted with a large thumb screw.

The finger rest is permanently fixed. No mouth adjustment or lever cap screw.

We recommend this plane as the ideal block plane for school use and are grateful for the co-operation of our school friends in designing it.

THE STANLEY RULE & LEVEL PLANT
Educational Department
New Britain, Conn.

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STANLEY TOOLS

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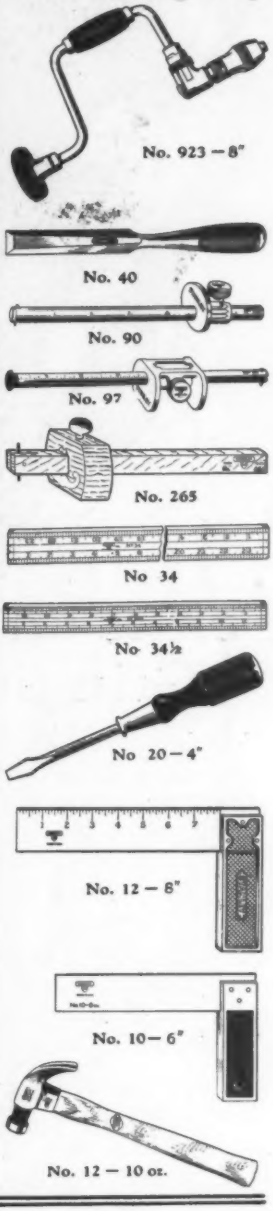

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Please send me copy of Stanley Tool Catalog No. 34—The Reference Book for Correct Shop Equipment.

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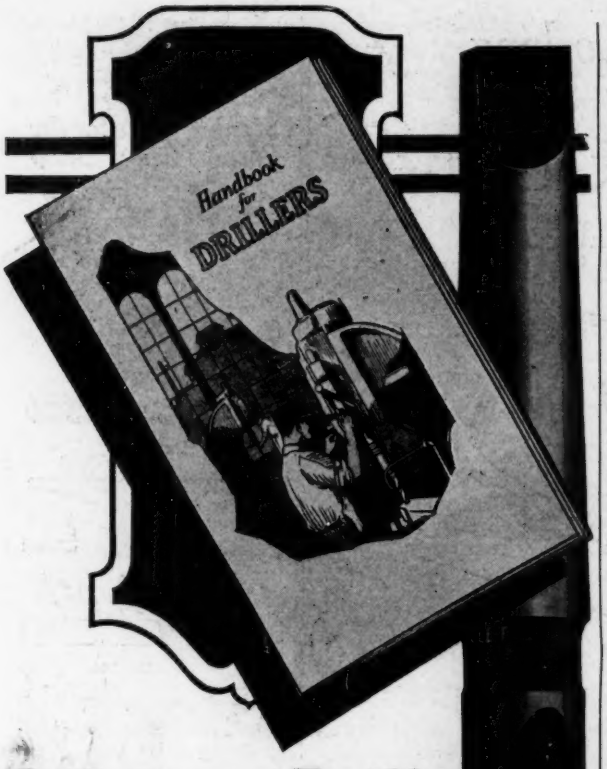

Points on Drill Grinding

Putting a proper point on the business end of a twist drill doesn't sound hard—but the fact is that 11 pages, or practically 25% of the "Handbook for Drillers," are devoted exclusively to this all-important thing. In reality pointing a twist drill is a delicate piece of work calling for great skill, and much advance knowledge.

If you would like copies of the Handbook for the use of students in machine shop practice, we shall be glad to send them to you, without charge, in any reasonable quantities.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from Page 124)

nish, as these are very durable and have good body without the time required for drying, typical of the older types of varnish of equal quality. While the term "four-hour" is technically correct, do not expect to be able to sand or recoat under twelve hours unless the work can be kept in a free circulating atmosphere of 80 to 90 deg. F., in which case you can get fast results. Sand all well-dried coats with a split 6/0 or with wet-or-dry and water after the second coat. Rub the last with felt pad, crude oil, and pumice stone until free of nibs. Remove the sludge by rubbing with a cotton flannel wet with water and used as a rubbing pad. This will give a finish that cannot be duplicated in any other manner.—*Ralph G. Waring.*

Filler Under Lacquer

907. Q.: What make of wood filler, or what type, should be used under lacquer? I understand that commercial finishers had a good deal of trouble with ordinary fillers, under lacquer. Is regular filler O.K., or should a special filler be used? I would appreciate your indicating a good make, if a special type is used.

Some instructions on wood finishing specify that a coat of shellac be applied over the stain, to seal it, before applying filler. Others specify a coat of filler, right over the stain, before any shellac is employed. Which is correct? Will not the oil in a filler tend to darken the effect, if it is applied direct to the stained wood?—*J. T.*

A.: You are entirely correct in believing that the usual commercial fillers will give considerable trouble when used under most lacquers. In most cases, this is a direct result of the solvent action of the lacquer thinners attacking the partly hardened or oxidized oils forming the grinding liquid of the filler.

The best way to overcome this trouble, is to use the newer "four-hour" varnishes as a base, together with the usual driers and turpentine. A practical formula easily made up from local materials is as follows:

Natural Paste-Filler Base, for use under lacquers:

12 oz. Four-hour Varnish
1 oz. Turpentine Japan Drier
1 oz. Boiled Linseed Oil
2 oz. Pure Turpentine

Stir the above liquids thoroughly, then add to 5 lb. of silex, or silica, to make a stiff, puttylike mass.

For mahoganies, walnut, and similarly grained woods, use 12 to 14 lb. of paste per gallon of turpentine, or turpentine 1 part and gasoline 2 parts when diluted for use. For birch, cherry, gum, and similar woods which apparently need no filling, a mixture using 5 to 7 lb. of paste per gallon of thinner will be found to give worth-while results.

Where it is possible to get them, use colors ground in japan rather than oil, when coloring the paste to match the various woods. In any case keep the thinned filler in a tight compression-top tin can, since the above combination is very fast in its drying action. Be very careful to clean off all traces of filler, since the mixture will harden to a rocklike state.

By all means apply a coat of shellac over the stain, especially if it is of the oil type. This does several things. First, it seals the wood and thereby prevents oil absorption by the wood with a subsequent discoloration; second, it stiffens any fibers raised by the stain, thereby permitting their easy removal by sanding with a split 6/0 finishing paper and thereby producing a much clearer finish than can be produced otherwise. Last, it is of great service in speeding up the easy removal of all excess filler. It should be borne in mind, however, that this coating should never be used heavier than a very watery liquid, strictly speaking a one-pound cut made by diluting standard four-pound stock shellac with three volumes of denatured alcohol. Best of all, this reduced shellac should be slowly stirred into an equal volume of "shellac-mixing lac-

(Continued on Page 28a)

Send for the New Starrett Catalog

The coupon on this page will bring you the new Starrett Catalog, describing and illustrating over 2500 Starrett Tools, Tapes and Hacksaws. It presents many new tools, many improvements in the tools you already know.
You will find this new catalog an extremely useful reference book. Tear out the coupon, fill it in, mail it today.

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Use Sta[illegible] Tools

The L. S. STARRETT CO., Athol, Massachusetts
Gentlemen: Please send me my copy of Starrett Catalog No. 25CE. I am a Student ☐, Instructor ☐, Principal ☐, Superintendent ☐. I am particularly interested in tools for woodworking shops ☐, machine shops ☐, apprentice training shops ☐. Please check.

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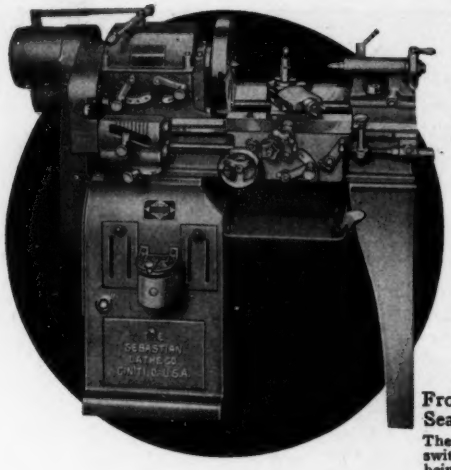

The 11-inch Gold Seal Heavy Duty Lathe was built to fill the need for a small, high speed lathe capable of production work and at the same time incorporating all the features necessary for extremely close precision work.

a safe lathe!

The SEBASTIAN Gold Seal

From the standpoint of personal safety for the operator, the 11-inch Gold Seal heavy duty lathe is unsurpassed.

The motor is built in the leg beneath the headstock and is controlled through a convenient switch within easy reach of the operator. There are no open belts or exposed pulleys, drive being accomplished through a fully enclosed, safe, motor chain. All speed changes are obtained through two levers at the front of the headstock—no removal or insertion of separate gears is necessary and it is impossible to jam the gears by locking in two speeds simultaneously.

Starting and stopping of the lathe itself is independent of motor control and is accomplished by a friction drive controlled by a lever within easy reach. All feeds and threads are controlled by two levers on the quick change box and one sliding on the quick change tumbler shaft. It is absolutely impossible to engage both lead screw and feed shaft at the same time.

The lathe itself is carefully protected against damage due to carelessness or overload. It is the heaviest machine of its size built and in addition it is provided with a safety shear pin at the end of the quick change box. This pin will shear under dangerous overload before any damage can be done to the lathe itself.

Safety should be a dominating feature of every school machine, and we honestly believe there is no safer lathe than the SEBASTIAN Gold Seal.

Gold Seal SEBASTIAN LATHES GUARANTEED CORRECT

THE SEBASTIAN LATHE CO.

CINCINNATI, OHIO

New York Office—Room 372—50 Church Street

(Continued from Page 26a)

quer." This is the ideal undercoater, for ease of sanding, adhesion to succeeding coatings, and waterproofness when used as a complete finish.

In case you cannot secure the raw materials for your filler locally, Pratt & Lambert, of Buffalo, N. Y., or The Murphy Varnish Co., of Newark, N. J., will be able to take care of your requests.—*Ralph G. Waring.*

THE JANUARY MEETING OF THE BOSTON VOCATIONAL SOCIETY

The annual get-together meeting of the Vocational Education Society of Boston was held on Saturday, January 11, at the Hotel Westminster, Boston. The meeting which was the thirtieth anniversary of the society, was attended by 176 men, which was the largest attendance in the history of the organization. President Gearon, who presided, thanked the members for the large attendance.

Upon a vote of the membership, Mr. George Seabury and Mr. Henry G. Wendler were received as members. A letter of sympathy was sent to Mrs. Kingman, whose husband was a former member. A moment of silence was observed for the members who had passed away during the year.

Mr. Emerson, the first speaker on the program, talked on the early manual-training movement and the organization of the society. He told how, in 1889, seven men teachers of Boston met in South Boston for the purpose of forming a club or society of men teachers of manual training. The seven charter members were Messrs. Hatch, Emerson, Brodhead, Clarke, Tryon, Carter, and Miller. Of the original seven, four are still in the service of the Boston schools, two are deceased, and one, Mr. Tryon, is located in Detroit. The first meeting was held in 1900, and in 1903 the membership had reached 38 members.

Mr. E. L. Bowman, who followed Mr. Emerson, took for his subject,"Your Chin on Your Shoulder," in memory of the tercentary of the founding the Massachusetts Bay Colony. He pointed out that the vocational-education movement was one of the four great forward movements originating in Massachusetts. These he termed milestones showing where we came from and where we are going. The establishment of the Douglas Commission, which he called the dawn of industrial education, caused New England to become vocationally minded. He pointed out that this section must remain so if she is to hold her own in competition with other states. The greatest contribution to education in the last quarter of a century he termed the trade analysis work which has been carried out by those engaged in vocational education. Although it is difficult to prophesy what the future holds, Mr. Bowman believes that there will be a wider acceptance of industrial education by industry because the industrial educators are selling it to the country. He pointed out that the vocational teacher has only just begun to become professional and he should show a far better professional spirit in the near future.

At the close of Mr. Bowman's talk, the social committee took charge, giving out prizes of books and tools to the winners of the contests held earlier in the evening. The prizes, which were donated by manufacturers and publishers, exceeded $100 in value.—*Louis A. Van Ham.*

SCHOOL CRAFTS CLUB MEETING

The School Crafts Club of New York City held its regular meeting at the Geneva Restaurant, New York City. The mem-

(Continued on Page 31a)

(Continued from Page 28a)

bers took up the discussion of a number of problems of special interest to all.

Mr. Ralph Schnader, of the Philco radio concern, gave an illustrated talk on radio manufacturing methods. He explained the entire process of manufacture, beginning with the raw material, and ending with the different manufacturing operations. Mr. L. J. Barker, of Orange, N. J., gave an exhibit of a number of projects in iron, and conducted a round table discussing the methods used in their construction. Mr. Harry Fletcher showed samples of marquetry work produced in school shops.

The meeting closed with the election of officers.—*N. A. Crow.*

MICHIGAN INDUSTRIAL-ARTS SOCIETY HOLDS MEETING IN GRAND RAPIDS

The second annual meeting of the Michigan Society for Manual Arts and Industrial Education will be held April 24, 25, and 26, at Grand Rapids. The organization which is composed of teachers and administrators interested in this phase of public-school administration, held its first meeting last year in Lansing.

The committees in charge of the convention arrangements this year, under the direction of Mr. L. R. Abbott, of Grand Rapids, have spared no effort in making this second convention of the society an enjoyable and profitable one. Speakers of national reputation have been obtained to address the meetings, and a number of round-table meetings, and special educational features have been arranged. A large number of the commercial houses have obtained space for exhibits of educational products.

The officers of the society are: Mr. George B. Frazee, Jr., Grand Rapids, president; Mr. A. C. Tagg, Fordson, vice-president; Mr. Earl L. Bedell, Detroit, secretary-treasurer.—*L. L. Hutt.*

VOCATIONAL SECTION OF THE PENNSYLVANIA EDUCATION ASSOCIATION HOLDS MEETING

The annual meeting of the Pennsylvania Vocational Association held December 26–27, at New Castle, opened with a talk by Dean Chambers of the State College, on the subject, "What the Business World Expects of a Teacher." He emphasized the fact that the teacher serves by what he is and what he does, and the world expects a teacher to be a normal citizen of the community, to have good health and a pleasing personality, to be educated in a general way to appreciate art, and literature.

Mr. James H. Green, of South Bend, Ind., spoke upon the subject, "Training the Worker," pointing out that 75 per cent of the failures in the industrial plant are due to the fact that the worker was not trained in the proper way.

Mr. W. F. Brunton, of Harrisburg, Pa., exibited some well-constructed charts showing the 57 trades being taught in the day, evening, and trade classes of the state education department.

Mr. E. A. Dimmick spoke on the subject of curriculum problems. Mr. J. W. Fleming, of Allegheny, gave a report of the work of the permanent research committee of the state education association. He mentioned a test of the electrical system which is in use in the automotive mechanics course. The test which is quite complete, should prove a valuable contribution to the automotive mechanics teacher. Dr. G. D. Whitney summed up the discussions.

The meeting closed with the election of officers for the coming year. Mr. F. J. Coyte of Pittsburgh, was elected president; Mr. John O. Judge, of Uniontown, vice-president; and Mr. Dean Conner, Pittsburg, secretary.—*G. C. Donson.*

WABASH VALLEY INDUSTRIAL EDUCATION CLUB HOLDS MEETING

The Wabash Valley Industrial Education Club held a meeting on Monday evening, December 9, with Mr. E. H. Ting-

(Continued on Page 32a)

Just a turn of the screw tightens the handle.

You need this *Safety* feature in School Shop Tools

HOW often have you picked up a hammer and found that the head wobbled; had to waste time rewedging it before it was safe for your boys?

The tightest-wedged handle is bound to loosen from steady pounding and shrinkage.

So Plumb discarded old methods of wedging and set out to invent a wedge that would retighten a handle when it finally loosened.

The Screw Wedge is the result of that experimenting. It eliminates loose handles for all time.

At the first sign of looseness, you just turn the screw, and the head is tight again.

Always safe! Always as perfectly balanced as when new.

You need this feature in your school shop tools. Tight handles give your boys more confidence, and eliminate flying heads.

Specify Plumb Hammers and Hatchets, with the Red Handle and Black Head, on your next tool requisition.

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DOUBLE LIFE
Hammers Hatchets
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An installation of 40 Kewaunee Desks

Manifold Desk
No. M-3025

SEE OUR DATA IN BRUCE'S SCHOOL SHOP ANNUAL 1930 EDITION

For Use in the following grades—

1. Platoon schools, or other forms of departmentalized programs. (Grades 2 or 3, to 6 or 8)
2. Non-departmentalized elementary school programs.
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Kewaunee MANIFOLD TABLES

Make manual training rooms available for art classes, industrial arts or craft classes, also general academic classes by equipping them with Kewaunee Manifold Tables. They turn the usual part-time manual training room into an all-day classroom. They provide more room for handling additional pupils in your present buildings and they eliminate duplicate teaching.

Kewaunee Manifold Tables are designed to be pedagogically correct for use with any of the following subjects—

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Write for Kewaunee Book

The new Kewaunee Book fully explains the advantages of the Manifold Table, illustrates all models and pictures actual installations. Write for it. It is sent to teachers or school equipment buyers requesting the book on their institution's letterhead.

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Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges
Factories at Kewaunee, Wis., and Adrian, Mich.

(Continued from Page 31a)

ley, of Dayton, Ohio, as the speaker of the evening. Mr. Tingley in his talk, stressed the need for a study of the human problem in industry as one of the great problems facing the foreman of today. He spoke of the need for resourcefulness in foremen as one of the great handicaps facing these men and one which is often aided by the formation of foremen study and discussion groups.

Mr. Tingley spoke especially of the formation of the National Association of Foremen, which is an outgrowth of the development of foremanship training programs, sponsored by the Federal Board. As a result of the happy experiences and helpful times which the participants experienced in discussing their problems of handling men and materials, these men have united to form a national body, which is turning its attention to other communities in establishing this profitable means of aiding in promoting better human relatons in industries throughout the country.

Commenting on the work of the organization in tying up the work of teaching or helping the student teacher, Mr. Tingley mentioned the need of teaching or helping the student to see the need for developing the greatest amount of resourcefulness possible in his case. Students should be taught to see the importance of proper human relations, if industry is to succeed or if they are to succeed in industry. The industrial executive of the present day is becoming more and more a student of psychology in his attempt to understand better methods of conducting his phase of the industry.

At the January meeting the club has the opportunity of hearing an address by Mr. W. T. Bawden, of the Manual Arts Press, who is carrying out studies regarding methods of improving the relationship of trade and industrial training and the placement of students in local industries.

The meetings for the balance of the year will include a dinner, in addition to a professional discussion hour.—*H. A. Huntington.*

EASTERN SHORE TEACHERS OF MARYLAND MEET AT EASTON

The industrial-arts teachers of eight counties in Maryland held a meeting on January 17, at Easton. Teachers from Carolina, Dorchester, Kent, Queen Anne, Talbot, Somerset, Wicomico, and Worcester counties were present to listen to the discussions.

Mr. W. L. Hull, of Easton, talked on "The Purposes and Methods of Teaching Related Subject Matter in the General Shop"; Mr. J. Max Chambers, of Federalsburg, took up the subject, "Shop Devices for Teaching Industrial Arts"; Dr. M. M. Proffitt, of the U. S. Office of Education, discussed "The Relations of Industrial Arts to Vocational Industrial Education; and Mr. A. L. Farver, of Cambridge, talked on "The State Manual for Industrial-Arts Teachers." Mr. O. C. Blades, of Chestertown, gave a summary of the meeting.

Mr. John J. Seidel, state supervisor of industrial education, and Mr. E. Clarke Fontaine, supervisor of high schools, were present, the former presiding at the sessions.

INDUSTRIAL-ARTS TEACHERS ORGANIZE

The industrial-arts teachers of Southwest Connecticut, at a meeting in Norwalk, formed an organization under the name of the Connecticut Industrial and Practical-Arts Education Association.

The purpose of the association is to promote industrial and practical-arts education in the schools of the state and to assist teachers in their professional advancement. The society is coöperating in forming sectional groups throughout the state so that all shop men may have an opportunity to affiliate themselves with the movement. A combined yearly meeting is

(Continued on Page 34a)

Test the Merits of Art-Fibre Weaving

ART-FIBRE weaving is a hand craft for school classes. Many useful pieces of household furniture can be made. The assembly of the frames and the weaving trains and benefits the student. The project is a piece of furniture which can be used in the student's own home. The use of colored weaving materials teaches a proper conception of color values in a practical way.

The making of woven furniture provides a fascinating practical handcraft at economical cost. No machinery is required. Special tools are not necessary. Classes may be conducted in ordinary classrooms. Suitable for grammar, junior high and high schools. Furniture made is useful and decorative. Weaving materials are made in many colors. Magazine trays, footstools, chairs, lamps, ferneries, sewing stands, rockers, davenports and other pieces of furniture of practical use in the home can be made.

In order that you may know the merits and advantages of this practical handcraft to your school, we suggest you make the magazine tray pictured here. The complete materials cost only $1.00, plus a few cents postage. (Postage: up to 150 miles from Grand Rapids, 11 cents; up to 300 miles, 16 cents; up to 600 miles, 24 cents; up to 1000 miles, 33 cents.) You will learn more about this fascinating handcraft in a few hours actual weaving experience than all other arguments. No salesman will call on you. You, and you alone, decide the value of Art-Fibre weaving to your school.

The magazine tray measures 8¼ inches wide by 15 inches long and stands 15 inches high. All materials come to you ready to weave. Wooden base has holes bored, ready to insert stakes and dowels. Weaving materials furnished in attractive color combination of black and orange. Complete, step-by-step pictures illustrate and describe every operation essential to weave this attractive magazine tray. When woven you will have a decorative and useful magazine tray worth much more than the one dollar you pay for the materials.

Just enclose your check for one dollar, plus the postage, with this advertisement.

Grand Rapids Fibre Cord Company, 609 Myrtle Street, N. W., Grand Rapids, Michigan

You don't have to pamper this Colored Pencil

SHARPEN IT TO A NEEDLE POINT... BEAR DOWN HARD

it will not break!

Here is photographic proof of the popularity of the New Eberhard Faber Mongol Colored Indelible Pencil. One small advertisement brought hundreds of coupons — each with a dollar bill attached.

THE New MONGOL Colored Indelible Pencil has proved an amazing success from the start!

Demand a lot from this pencil. You'll get it.

Sharpen it to a needle point. Press down as heavily as you wish when drawing a line. Drive its point through heavy cardboard — *still it will not break!*

Gives an EXTRA service, too. Use it like a crayon. Then spread the color with a brush dipped in clear water. *The result — a smooth, even wash.*

Try this remarkable pencil, not only on paper but on other materials, such as fabrics, wood, etc. You'll be enthusiastic, as are the thousands who are already putting it to constant use.

For a selection of 12 different colors and free copy of the famous Pencil-Selection Chart, mail the coupon with a dollar.

EBERHARD FABER

IA-2

EBERHARD FABER PENCIL CO.
37 Greenpoint Ave., Brooklyn, N. Y.

☐ Enclosed is $1.00. Send me a handy easel-type box containing 12 different colors of the new Mongol Colored Indelible Pencils.

☐ Send me *Free* copy of the Eberhard Faber Pencil-Selection Chart. (*check*)

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(Continued from Page 32a)

planned to be held on the convention day of the state teachers' association and to form an integral part of its program.

At the 1929 meeting, officers were elected as follows: President, Mr. F. S. Whitman, Bridgeport; vice-president, Mr. L. Getman, Westport; secretary-treasurer, Mr. A. J. Vogt, Stamford.

The second meeting of the association on October 23, 1929, resulted in the admission of a number of new members from Greenwich. A fine program was carried out, with Mr. A. J. Vogt, Mr. Joseph Maurer, and Mr. Arthur Feuerstein as speakers. A number of discussions of interest and value to the members were carried out.

The association now has a membership of thirty, seventeen of whom were present at the October meeting. A total of seven cities are represented in the membership. The next meeting will be held in February.—*Angelo Maruca.*

WESTERN ARTS ASSOCIATION CONVENTION

The Western Arts Association will hold its annual convention in Minneapolis, May 6 to 9 inclusive. It has been twenty years since the Association has met in Minneapolis and the local committees are planning quite a celebration. A program is being arranged by Miss Myrtle Irons, Vice President, acting as Chairman of the Program Committee. Mr. J. H. McCloskey, President, has taken for the general theme of the meeting, "Adjustment of the Arts to Modern Education."

Material and equipment exhibits as well as school exhibits will be placed in the first-floor lobby of the Leamington Hotel. Information concerning school exhibits may be secured from Mr. Robert S. Hilpert, chairman, c/o University of Minnesota. Information concerning space available for material and equipment exhibits may be secured from the secretary of the Western Arts Association, Mr. Harry E. Wood, 5215 College Avenue, Indianapolis.

Speakers of national reputation in the field of art, industrial art, and vocational education are being selected to appear on the program. Unique plans are being developed for the entertainment at the annual dinner, and word has been broadcast that the "Ship" will give an informal get-together program.

The Leamington Hotel will be headquarters, with the Curtis Hotel, directly across the street, assisting with meetings and the housing of delegates. Miss Bess Eleanor Foster, director of art in Minneapolis, is actively in charge of local arrangements.

THE DECEMBER MEETING OF THE OKLAHOMA CITY CLUB

The December meeting of the Oklahoma City Industrial-Arts Club was held on December 11, at the Central High School, Oklahoma City. Mr. Claude A. Keenan was in charge as chairman.

The principal speaker on the program was Mr. H. F. Rusch, supervisor of industrial arts in the Oklahoma City schools, who gave a report on the convention of the Oklahoma Vocational Association, and of his recent trip to New Orleans, where he attended the American Vocational Association meeting.

The meeting closed with a discussion of the subject matter and policies for teaching the broadening and finding courses in junior high schools.—*J. B. Greene.*

HOME ECONOMICS MEETING

The twenty-third annual meeting of the American Home Economics Association will be held June 24–28, at Denver, Colo. The headquarters for the convention will be in the Cosmopolitan Hotel. The general topic for discussion at the meeting is "The Modern Family and Its Home." Significant phases of the subject will be presented by speakers at the two general evening meetings, while other aspects will be taken up at the sessions of the subdivisions and professional departments.